LEXICON OF GEOLOGIC NAMES IN ALBERTA

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IN

ALBERTA

AND ADJACENT PORTIONS OF

BRITISH COLUMBIA AND NORTHWEST TERRITORIES

ALBERTA SOCIETY OF PETROLEUM GEOLOGISTS

CALGARY, ALBERTA

1954

FOREWARD

The compilation of this Lexicon of Geologic Names in Alberta and adjacent portions of British Columbia and Northwest Territories is the result of a concerted effort of many geologists. In order to accomplish this, approximately 200 geologic names were assigned to geological departments of the various oil companies and consulting groups who in turn assigned them within their organizations.

The following persons acted as consultants:

Upper Cretaceous	C. R. Stelck, University of Alberta, Edmonton
Lower Cretaceous	Peter Badgley, West Maygill Gas and Oil Ltd.
Jurassic	M. B. Crockford, J. C. Sproule & Associates
Triassic & Permo-Penn	C. E. Cleveland, Pacific Petroleums Limited
Mississippian	D. G. Penner, Royalite Oil Co. Ltd.
Devonian Outcrops	Andrew D. Baillie, Canadian Gulf Oil Co. Ltd.
Subsurface	John Newland, Trafford & Associates
Silurian, Ordovician, Cambrian	F. K. North, California Standard Company

Not all of the geologic names used in the area are included in this Lexicon. It is intended that in time the list will be made complete and that new pages will be added as new names come into use. The loose-leaf nature of the booklet will allow of such expansion. Likewise revisions may be made by substituting new descriptions for the old. To this purpose it is urged that suggestions for expansion or revision be brought to the attention of the Geologic Names and Correlations Committee. Descriptions still to be completed, to an estimated limit of 200 names, will be furnished by mail to purchasers of the book.

The serious-minded and whole-hearted effort on the part of numerous geologists should be commended to themselves and brought to the attention of other readers. They have clarified geologic thinking and will save much individual search for information in the future.

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ALBERTA SOCIETY OF PETROLEUM GEOLOGISTS

Geologic Names and Correlations Committee

O. A. Erdman, Canadian Gulf Oil Company

A. J. Goodman, Socony-Vacuum Oil Co. of Canada

J. B. Webb, Anglo Canadian Oil Company

R. T. D. Wickenden, Geological Survey of Canada

L. E. Workman, Canadian Stratigraphic Service Ltd., Chairman

Lexicon Subcommittee

R. H. Erickson, Great Plains Development Co.

T. P. Storey, Western Leaseholds

L. E. Workman, Canadian Stratigraphic Service Ltd., Chairman

Calgary, Alberta, August 25, 1954.

ALBERTA SOCIETY OF PETROLEUM GEOLOGISTS

CALGARY, ALBERTA

August 31, 1955.

The accompanying descriptions of geologic units will supplement those already furnished in the Lexicon of Geologic Names in Alberta. They may be inserted in their proper place in alphabetical order.

These complete the compilation of names and descriptions planned in the original book of 1954. There are other geologic units which should be described, and some of the original descriptions could be revised. It will be appreciated if a list of the names of additional units and corrections to present descriptions are kept on file by the owners of these Lexicons and furnished to the Lexicon Subcommittee when called for.

Lexicon Subcommittee of the
Geologic Names and Correlations
Committee.

ALBERTA GROUP: Lower Upper Cretaceous - Originally divided into an Upper and Lower formation but later Webb, (1934), suggested the name be given group status. Present usage follows that suggestion.

Author: Hume, G. S., (1930), "The Highwood - Jumping Pound Anticline, with Notes on Turner Valley, New Black Diamond, and Priddis Valley Structures, Alberta", Geol. Surv. Summ. Rept. 1929, Part B, pp. 6B-10B.

Locality: Originally applied to the foothills belt lying between Highwood and Bow Rivers, Alberta, but applicable over a belt extending from Crowsnest to Smoky River.

Lithologic Characteristics: The Lower Alberta consists of dark grey rusty-weathering sandy shales, and black thinly bedded fissile shales with thin hard siliceous cross-bedded sandstone bands and some clay, ironstone concretions. A thin "grit" bed occurs near the base. The Upper Alberta consists of hard siliceous coarse-grained rusty-weathering sandstones, conglomerates and shales at the base (Cardium), and dark grey to black thinly bedded sandy shales with abundant ironstone concretions. Minor calcareous shale zones in the Alberta no doubt correlate in part with the first and second speckled shale zones of the plains.

Thickness: Varies from east to west but ranges from 2500' to 2900' in the type area. Poor exposures make definite measurements impossible.

Correlation and Age: Because the Cardium beds are an easily recognizable unit in the field, Rutherford, (1928), and Beach (1943) raised them to formational status. Thus the Alberta became divisible into Lower Alberta, Cardium and Upper Alberta formations. They are readily correlated with the Blackstone, Bighorn and Wapiabi formations of the foothills north of the Bow River, and southward to the Crowsnest Pass. This group also correlates with all but the bottom of the Colorado shales of the plains of Alberta and Montana. In N.W. Alberta the formation is largely equivalent to the Smoky River group (Gleddie 1947). Webb (1934), assigns Lower Turonian for Lower Alberta, ranging through Coniacian for Cardium and lower Upper Alberta (Coloradoan), to early Santonian (Montanan) for uppermost Alberta. Since the basal beds of the Colorado on the plains are Cenomanian and late Albian (Stelck) and therefore upper Lower Cretaceous, the Alberta shales are only correlative with part of the Colorado and the name Alberta should be restricted to Foothills regions where it was originally applied.

Relation to Other Units: Rests conformably on the Blairmore and is overlain conformably by the Belly River. A transition zone at the top carries a Montanan fauna.

References:

Beach, H. H., (1943), "Moose Mountain and Morley Map-Areas, Alberta". Geol. Surv. Canada Memoir 236, pp. 41-47.

Gleddie, Joseph, (1949), "Upper Cretaceous in Western Peace River Plains, Alberta". Bull. Amer. Assoc. Petrol. Geol. Vol. 33, No. 4, pp. 511-532.

Hume, G. S., (1928), "Oil Prospects Near Bragg Creek, Alberta", Geol. Surv. Canada Summ. Rept. 1927, Pt. B, pp. 7B-9B.

Rutherford, R. L., (1928), "Geology Along the Bow River Between Cochrane and Kananaskis, Alberta", Sci. and Ind. Research Council (Univ. of Alberta, Edmonton) Rept. 19.

Stelck, C. R., (1952), Address before Alberta Soc. Petrol. Geol., unpublished.

Webb, J. B. and Hertlein, L. G., (1934), "Zones in Alberta Shale in Foothills of Southwestern Alberta", Bull. Amer. Assoc. Petrol. Geol. Vol. 18, No. 11, pp. 1387-1416.

Prepared by: G. G. Scruggs, Amerada Petroleum Corp., Calgary, June 1954.

ALEXO FORMATION: Upper Devonian, named from Village of Alexo, Alberta

Author: de Wit, R. and McLaren, D. J., 1950, Devonian Sections in the Rocky Mountains between Crowsnest Pass and Jasper, Geol. Sur. Can., Paper 50-23.

Locality: The type locality is at the Saskatchewan River Gap in the Brazeau Range, Alberta.

Lithologic Characteristics: In the earlier work done by de Wit and McLaren, the Alexo was described as follows: "Limestone, bedded and brecciated; some fine sandstone; dolomite; all containing or interbedded with silt. Near Mountain Park and farther northwest the lower part is argillaceous or shaly and locally fossiliferous. Near Mountain Park and Morro Peak the base of the formation consists of a band of shale which is underlain by a conspicuously ochre weathering mudstone. Around Jasper the formation is much thicker than normal and is mostly composed of massive limestone with rhythmically distributed silt. Limestone breccias which are present at several places in the Alexo, may have been caused by collapse following the solution of evaporites." ". . . .deviations from the normal sequence may be seen at Morro Peak, where the formation includes a great thickness of nodular silty limestone, and near Climax Mountain where the basal part consists of argillaceous limestone." McLaren (1953) distinguished between a reef sequence called "carbonate" and an off reef sequence which he called "clastic". The carbonates were described as "thin-bedded silty dolomites and fine-grained laminated dolomites" and the clastics as "variable silty limestones and dolomites and shales."

Thickness and Distribution: The thickness varies from 100' to 620' and the formation is found in the Canadian Rockies from the Crowsnest Pass area to north of Jasper.

Relation to other Units: The Alexo is overlain by the Palliser formation conformably and is underlain by the upper Fairholme or the Mount Hawk. The formation is the equivalent to the upper part of Warren's lower Minnewanka, the upper part of Beach's Fairholme, and to the upper Cheviot of Kelly, (unpublished manuscript) redefined by Fox. The nomenclature is not now entirely settled as there is difference of opinion as to whether the Alexo and Mount Hawk are mappable units and deserving of formational status or whether they should be used only as members of the Cheviot where they can be distinguished easily. It is equivalent to the Winterburn (Calmar member) of the plains, to the lower Potlach of the southern plains, and perhaps to the lower part of the Three Forks of Montana (Fox). De Wit and McLaren, P. 11 et seq., give a very complete faunal tabulation.

References:

Beach, H. H., 1943, Moose Mountain and Morley map areas, Alberta, Geol. Surv. of Canada, Memoir 236, p. 6.

de Wit, R., 1953, Devonian Stratigraphy in the Rocky Mountains South of The Bow River, Alta. Soc. Pet. Geol., Field Conference Guidebook, pp. 105-107.

Fox, F. G., 1951, Devonian Stratigraphy of Rocky Mountains and Foothills Between Crowsnest Pass and Athabaska River, Alberta, Canada, Bull. A.A.P.G., Vol. 35, No. 4 (April), pp. 822-843.

Fox, F. G., 1953, Field Conference Guidebook, p. 194.

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McLaren, D. J., 1953, Summary of the Devonian Stratigraphy of the Alberta Rocky Mountains, Alta. Soc. Pet. Geol., Field Conference Guidebook, pp. 89-104.

McLaren, D. J., 1953, Reef Development in the Devonian of the Canadian Rockies, Paper presented to A.S.P.G. April 9, 1953, and abstracted A.S.P.G. News Bulletin, Vol. 1, No. 6, June, 1953.

Storey, T. P., 1953, Some Regional Devonian Correlations in Alberta, Canada, A.S.P.G. News Bull., Vol. 1, No. 10, October, 1953, pp. 3-6.

Warren, P. S., and Stelck, C. R., 1950, Succession of Devonian Faunas in Western Canada, Trans. Roy. Soc. of Canada, Vol. 49, Series III, Sec. 4, pp. 61-78.

Prepared by: K. A. Olson & J. F. Taft, Phillips Petroleum Company, Calgary, July 1954.

ALTYN FORMATION: Precambrian, Purcell Series. This formation outcrops extensively at and near the eastern edge of the Lewis Overthrust sheet.

Author: Willis, Bailey (1902), Stratigraphy and Structure of the Lewis and Livingstone Ranges, Montana; Bull. Geol. Soc. Amer., Vol. 13, p. 317.

Locality: Along the basal cliffs of the Appekunny Mountains, north of Swift Current Valley, near the town of Altyn, Montana.

Lithologic Characteristics: Three members are recognized. The lower member consists of thickly bedded, mottled dolomite and thinly bedded, laminated siliceous dolomite (200-800 feet); the middle member of massive, cliff forming, arenaceous and gritty dolomite, white weathering algal dolomite, and some black argillite (200-400 feet); the upper member of argillite with thin bedded, arenaceous dolomite (100-200 feet).

Thickness and Distribution: Thickness in the type section 1400 feet; in Waterton Park 1,000 to 1,400 feet as measured by Douglas, 3500 feet as measured by Daly. It occurs mainly in the front ranges of Waterton and Glacier National Parks.

Relation to Other Units: Succeeds the Waterton formation conformably and transitionally; overlain conformably by the Appekunny formation.

References:

Clapp, C.H. (1932), Geology of a Portion of the Rocky Mountains of Northwestern Montana; Montana Bur. Mines and Geology, Memoir No. 4.

Daly, R.A. (1912), Geology of the North American Cordillera at the Forty Ninth Parallel; Geol. Surv. Canada, Memoir 88, p. 57.

Douglas, R.J.W. (1952), Waterton, Alberta; Geol. Surv. Canada, Paper 52-10.

Prepared by: F. G. Fox, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

APPEKUNNY FORMATION: Precambrian, Purcell Series. The Appekunny formation outcrops extensively in the Clarke Range of Alberta and Montana.

Author: Willis, Bailey (1902), Stratigraphy and Structure of the Lewis and Livingstone Ranges, Montana; Bull. Geol. Soc. Amer., Vol. 13, p. 322.

Locality: Appekunny Mountain, Montana.

Lithologic Characteristics: Dominantly massive green argillite, with thick greenish-grey quartzite beds, one at the base and two others in the lower 500 feet of the formation; some red argillite, and many thin green quartzite beds. The quartzites of the lower part grade laterally to argillite. In Montana reddish and white argillite appear, and ripple marks are common. Daly mentions that the whole formation is highly siliceous.

Thickness and Distribution: Thickness on Appekunny Mountain, 2000 feet; at Waterton, on Ruby Ridge, 1625 feet; and on Bellevue Hill 1100 feet. The Appekunny outcrops widely in the Lewis Overthrust sheet in Alberta and Montana. Not known elsewhere in Alberta.

Relation to Other Units: Succeeds the Altyn formation conformably; overlain conformably by the Grinnell Formation.

References:

Clapp, C.H. (1932), Geology of a Portion of the Rocky Mountains of Northwestern Montana; Montana Bur. Mines and Geology, Memoir No. 4.

Daly, R.A. (1912), Geology of the North American Cordillera at the Forty Ninth Parallel; Geol. Surv. Canada, Memoir 88, p. 66.

Douglas, R.J.W. (1952), Waterton, Alberta; Geol. Surv. Canada, Paper 52-10.

Prepared by: F. G. Fox, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

ARCTOMYS FORMATION: Upper Cambrian.

Author: Walcott, C.D. (1923), Nomenclature of Some Post-Cambrian and Cambrian Cordilleran Formations, Smithsonian Misc. Coll., Vol. 67, pp. 457-476, fig. 24.

Type Locality: South slopes of Sullivan and Survey Peaks on the north side of Glacier Lake (pl. 2b at B).

Lithologic Characteristics: "Bluish-gray irregularly laminated cliff-forming limestones which are more or less magnesian in some layers. This limestone is underlain by a series of arenaceous and siliceous shales with bands of hard, finely laminated,dove-colored limestone." (Walcott, 1923, p. 462).

"Finely laminated, smooth-surfaced limestones overlying siliceous, arenaceous, and calcareous shales and interbedded laminated limestones. The entire formation at Glacier Lake conveys the impression that it was a deposit of fine silts, sands, and calcareous muds or slimes in a shallow sea that marked the beginning of the upper Cambrian in the Cordilleran Geosyncline in this area. At Mount Bosworth, Ranger Brook Canyon, and Cotton Grass Cirque ripple marks, mud cracks, and casts of salt crystals occur on the hard finely arenaceous shaly layers." (Walcott, 1928, pp. 245-246).

Thickness and Distribution: At the type locality near Glacier Lake 1,386'. Much thinner elsewhere. Occurs at Glacier Lake Canyon and headwaters of Saskatchewan River. It occurs to the southwest in the Ranger Brook Canyon section of the Sawback Range, and is represented at Mount Bosworth on the north side of the Bow River Valley. The parti-colored arenaceous shales at the base of the Lynx formation of the Robson massif at Snow Bird Pass represents the Arctomys formation in the Robson Peak District.

Relation to Other Units: In the type section the upper Cambrian Sullivan formation overlies and the Middle Cambrian Murchison underlies the Arctomys. In the Sawback Range the Arctomys lies between Upper Cambrian Bosworth and Middle Cambrian. In the Kickinghorse Pass, the Arctomys rests on the Middle Cambrian Eldon. Fauna restricted to poorly preserved Obolus (?) sp.

References:

Deiss, C. (1939), Cambrian Formations of Southwestern Alberta and Southeastern British Columbia, Bull. Geol. Soc. Amer., Vol. 50, pp. 1009-1010.

Deiss, C. (1940), Lower and Middle Cambrian Stratigraphy of Southwestern Alberta and Southeastern British Columbia, Bull. Geol. Soc. Amer., Vol. 51, pp. 739-740.

Fox, F.G. (1953), Glossary of Formation Names of Southwestern Alberta, Alberta Soc. Petrol. Geol. Third Ann. Field Confer. and Symp., Guide Book, pp. 189-190.

Walcott, C.D. (1928), Cambrian Geology and Paleontology, No. 5: Pre-Devonian Paleozoic Formations of the Cordilleran Provinces of Canada, Smithsonian Misc. Coll., Vol. 75, No. 5, pp. 245-6.

Prepared by: R . A. Briggeman, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

BAD HEART FORMATION: Smoky River Group of the Upper Cretaceous

Author: McLearn, F. H. (1918), Cretaceous of the Lower Smoky River, Alberta. Geol. Surv. Summ. Rept. 1918, Pt. C, pp. 1-7.

Locality: Cliffs along the Smoky River from below the Puskwaskau River nearly to the mouth of the Little Smoky River.

Lithologic Characteristics: Gleddie (1949), describes the formation as a medium to coarse grained sandstone which weathers dark red in all exposures. The individual quartz grains are mostly clear and subangular. Ironstone concretions are common and some interbedded sandy shale is found. Marine fossils are numerous and bands of chert pebbles are present.

Thickness: Varies from 5 - 25 feet in the type area and probably thickens to the west.

Correlation: The combined fauna of the Bad Heart sandstone and the top of the Kaskapau shale, containing Scaphites ventricosus and Inoceramus umbonatus, is correlated with the upper part of the Colorado shale of southern Alberta and northern Montana, and the Niobrara of Wyoming. It was originally postulated that Bad Heart was an eastern extension of Cardium. Stelck (1954) has presented evidence that they are separate and the Cardium is 330 feet below the Bad Heart in the Red Willow Creek well in British Columbia.

Age: McLearn (1926) assigns a Lower Santonian and Coniacian age for the above mentioned faunal assemblage.

Relation to other Units: Rests conformably on the dark marine shales of the Kaskapau and is overlain by marine shales of the Wapiabi. The contact with the Wapiabi is conformable but abrupt and is transitional with the Kaskapau.

References:

McLearn, F. H. (1918) Cretaceous of the Lower Smoky River, Alberta. Geol. Surv. Rept. 1918, Pt. C, pp. 1-7.

McLearn, F. H. (1926) New Species from the Coloradoan of Lower Smoky and Lower Peace Rivers, Alberta. Geol. Surv. Bull. 42, 1926, p. 119.

Gleddie, Joseph (1949) Upper Cretaceous in Western Peace River Plains, Alberta. Bull. Amer. Assoc. Petrol. Geol., Vol. 33, No. 4, pp. 521-532.

Stelck, C. R. (1954) Address before C.I.M. & M. and Geol. Assoc. of Canada, May, 1954, unpublished.

Prepared by: J. H. Lackie, Amerada Petroleum Corp., Calgary, July 1954.

BANFF FORMATION: Lower Mississippian

Author: Shimer, H. W., 1926, Upper Paleozoic Faunas of the Lake Minnewanka Section, near Banff, Alberta, Bull. Geol. Surv. Canada, No. 42, pp. 1-89.

Locality: Not designated by Shimer, but presumably Mount Inglismaldie.

Lithologic Characteristics: "Predominately a dark grey to black calcareous shale, weathering brownish. It is typically shale below, but becomes more and more calcareous above, until, with many repetitions of shale and limestone, it merges with the ... Rundle limestone."

Thickness and Distribution: 1388 feet on Sulphur Mountain, 1408 feet on Rundle Mountain. Averages about 700 feet in the front range. Thins eastward and extends across southern Alberta.

Relation to other Units: Conformably overlies Exshaw formation. (in some places, however, there has been noted evidence of a slight disconformity). Conformably overlain by Rundle formation. (At Moose Mountain there is a slight disconformity at the top of the Banff).

References:

Beach, H. H., 1943, Moose Mountain and Morley Map-Areas, Alberta, Geol. Surv., Canada, Memoir 236, pp. 18-22.

Warren, P. S., 1927, Banff Area, Alberta, Geol. Surv., Canada, Memoir 153, pp. 21-27.

Fox, F. G., 1953, A.S.P.G. Field Conference and Symposium, pp. 196-197.

BASSANO MEMBER: Bearpaw formation, Upper Cretaceous

Author: Russel, L. S., 1932, The Cretaceous-Tertiary Transition of Alberta, Royal Society of Can. Trans., Series 3, Vol. 26, Sec. 4, pp. 125-126.

Locality: Bow River, south of Bassano, Alberta.

Lithologic Characteristics: "Finely banded, brown, sandy shale and clayey sandstone." (Russel 1932)

Thickness and Distribution: Member extends roughly from the Hanna district to the Little Bow River with a maximum thickness of approximately 200'.

Relation to other Units: Overlain by the Edmonton Formation and underlain by the main Bearpaw shale.

References:

Russel, L. S. and Landes, R. W., 1940, Geology of the Southern Alberta Plains, Geol. Survey of Can. Memoir 221.

Prepared by: Anglo-Canadian Oil Company Limited, Calgary, July 1954.

BATTLE FORMATION: Upper Cretaceous

Author: Furnival, G. M., 1942, Preliminary Map. Cypress Lake, Saskatchewan, Geol. Survey of Can. Paper 42-5.

Locality: East side of Adams Creek, N.E.¼ Sec. 8, Twp. 7, Rge. 28, W3M.

Lithologic Characteristics:

Upper member - "Interbedded olive-green to greenish-grey shale, silts, argillaceous sands, and olive green bentonite." (Furnival).

Lower member - "Bentonite, weathering dark chocolate brown to black, bentonitic shale."

Thickness and Distribution:

Upper member - "varies in thickness up to an observed maximum of 10'." (Furnival)

Lower member - "rangee in thickness from 5' - 30' and is commonly 20' thick."

Relation to other Units: Overlies the Whitemud formation and underlies sands of the Frenchman formation.

References:

Lines, F. G., 1947, Stratigraphy of the Bearpaw and Later Formations of the Alberta Plains, Unpublished (March, 1947).

Furnival, G. M., 1950, Cypress Lake Map Area, Saskatchewan, Geol. Survey of Canada, Mem. 242.

Prepared by: Anglo-Canadian Oil Company Limited, Calgary, July 1954.

BAYTREE MEMBER: Cardium (Badheart) formation, Smoky River group, Upper Cretaceous.

Author: Stelck, C. R., unpublished.

Locality: One mile east and 2½ miles south of Baytree P.O., Alberta, N.W.¼ Sec. 25, Twp. 78, Rge. 13, W6 M.

Lithologic Characteristics: Massive black chert and quartzite conglomerate. Lowermost part contains cross bedded lenses of coarse sandstone and fine conglomerate, with sporadic coaly fragments. Pebbles as large as 2 and 3 inches not uncommon. (Gleddie)

Thickness and Distribution: Observed thickness in type section is approximately 50' and thins to 0' in the western section of the Peace River Plains.

Relation to other Units: Rests on sandstones of the Cardium (Badheart) formation and is overlain by shales of the Wapiabi formation.

References:

Gleddie, J., 1949, Upper Cretaceous in Western Peace River Plains, Alberta, A.A.P.G. Bull., Vol. 33, No. 4, April 1949, pp. 511-532.

Prepared by: Anglo Canadian Oil Company Limited, Calgary, July 1954.

BEARPAW FORMATION: Upper Cretaceous

Author: Hatcher, J. B. and Stanton, T. W. (1903), The Stratigraphic Position of the Judith River Beds and Their Correlation with the Belly River Beds, Science, N.S. Vol. 18, pp. 211-212.

Locality: North, east, and south margins of the Bearpaw Mountains, Montana.

Lithologic Characteristics: Predominantly dark grey or brownish grey shale that tends to weather into small angular fragments or flakes. Ironstone concretions and thin bentonite beds are common. (Russel, 1940).

Thickness & Distribution: The Bearpaw is found in Central and Southern Alberta except along the axial part of the Sweetgrass Arch where it has been removed by erosion. Thickness in the Southern Plains varies from 700' - 1100'.

Relation to other Units: Overlain by Blood Reserve Formation in Southern Alberta and Edmonton Formation in Central Alberta. Underlain by Oldman Formation in Southern Alberta and Belly River in Central Alberta.

References:

Stanton, T. W., and Hatcher, J. B., 1905, Geology & Paleontology of the Judith River Beds, U. S. Geol. Survey Bull. 257.

Dowling, D. B., 1917, The Southern Plains of Alberta, Geol. Survey of Can. Mem. 93.

Williams, M. Y. and Dyer, W. S., 1930, Geology of Southern Alberta and Southern Saskatchewan, Geol. Survey of Can. Mem. 163.

Link, T. A. and Childerhose, A. V., 1931, Bearpaw Shale and Contiguous Formations in the Lethbridge Area, Alberta, A.A.P.G. Vol. 15, No. 10.

Russel, L. S. and Landes, R. W., 1940, Geology of the Southern Alberta Plains, Geol. Survey of Can. Mem. 221.

Prepared by: Anglo-Canadian Oil Company Limited, Calgary, July 1954.

BEAR ROCK FORMATION: Lower Devonian or Upper Silurian

Author: An extensive history and revised definition of the Bear Rock formation has been made by Hume, G. S. and Link, T. A., 1945, Can. Geol. Surv. Paper 45-16, Canol Geological Investigations in the Mackenzie River Area, Northwest Territories and Yukon.

Locality: Type section is in the Canol area on Bear Rock which is at the junction of the Great Bear and Mackenzie Rivers at Ft. Norman, N.W.T.

History: Originally part of Bear Mountain formation (Kindle, E. M. and Bosworth, T. O., 1920)

Lithologic Characteristics: White weathering gypsiferous lensing dolomite in the lower section with a breccia of brown dolomitic limestone boulders in a matrix of dolomitic limestone in upper section. Two sections separated by a poorly bedded gray dolomite and limestone. Separated from overlying Ramparts formation by ten feet bedded limestone and dolomite breccia.

Thickness and Distribution: 100' thick in Redstone River area to 800'+ in Hanna River Area.

Relation to other Units: Disconformably overlies Ronning Group of well bedded Silurian limestone; disconformably overlain by Mid Devonian Ramparts gray limestone.

References:

Hume, G. S., 1922, Geol. of the Norman Oil Fields and a Reconnaissance of a Part of the Liard River, Geol. Surv. Can., Summ. Report 1922 Pt. B, pp. 47-64.

Hume, G. S. 1923, Mackenzie River Area, Dist. of Mackenzie, N.W.T., Geol. Surv. Can., Summ. Report. 1923, Pt. B, pp. 1-15.

Kindle, E. M. and Bosworth, T.O., 1920, Oilbearing Rocks of Lower Mackenzie River Valley, Can. Geol. Sur. Summ. Rept. 1920, Pt. B, p. 45.

Prepared by: Canada-Cities Service Petroleum Corporation, Calgary.

BEAVERFOOT FORMATION: Richmond, Ordovician

Author: Burling, Lancaster D., 1922, A Cambro-Ordovician Section in the Beaverfoot Range, British Columbia, Geol. Mag., London, Eng., Vol. 59 (Oct.), pp. 452-461.

Locality: The type section of Burling was measured "in the summit of the range (where it is crossed by Whisky Trail), overlooking the Columbia Valley at Mons (now called McMurdo) on the Kootenay Central Railway about 15 miles S.E. of Golden, British Columbia."

History: The earliest published work on the geology of the area was by McConnell who named the strata beginning with the quartzite (now the Wonah quartzite) and carrying through the Richmond beds the "Halysites Beds". Burling's work first defined the Beaverfoot formation but his section is in an area of isoclinal folding and includes beds which are not Beaverfoot (North). Walcott (1924) found Silurian fossils in the upper part of the Beaverfoot and termed these beds Brisco. Walcott's division is not mappable, however, and Walker (1926) combined the names into Beaverfoot-Brisco.

Lithologic Characteristics: The best published sections are by Walker (1926) and Evans (1932). The formation is a limestone series "thick to moderately thin bedded crystalline and semi-crystalline. The Richmond (Beaverfoot) or lower beds are, on the whole, more massive, more magnesian, and darker weathering than the Silurian (Brisco), or upper beds which are, on the whole, lighter weathering, thinner bedded, and less magnesian. The change, however, is transitional and no accurate lithologic division can be made. The formation is "selectively dolomitized", is highly fossiliferous, cherty in part (North), and is mountain-forming.

Thickness and Distribution: The thickness is variously given but the best measurements are on the order of 1800-2250'. It occurs SE of Golden, East of Columbia Lake, in the Purcell Range near Horsethief Creek, and in the Beaverfoot, Brisco, and Stanford Ranges, which are essentially the same range in British Columbia.

Relation to other Units: The overlying formation is the Brisco (Silurian) of Walcott (1924) and is indivisible from it "either on lithologic or faunal evidence". (Walker, 1926). Overlying the Beaverfoot and Brisco is the Devonian (?) Mount Forster formation. The underlying formation is the Wonah Quartzite of Ordovician (?) age. The relationship to other units laterally is given in a study by Alice E. Wilson who examined fossils collected by J. R. Marshall, E. M. Kindle, J. F. Walker, and L. D. Burling. She states the correlation "has to be made mainly by means of corals and brachiopods" and that although the Beaverfoot is more closely allied to the Stony Mtn. of Manitoba and the Bighorn Mtns. of Wyoming, a study revealed that "in almost every case there is a very definite specific difference". The Beaverfoot is the central part of the Halysites Beds of McConnell and Allan and the lower part of the Beaverfoot-Brisco of later workers.

References:

Allan, John A., 1914, Geology of Field Map Area, Geol. Sur. Can. Memoir 55, pp. 101 et seq.

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Evans, C. S., 1932, Geological Survey of Canada Summary Report, Part A, pp. 139-142.
Henderson, G.G.L., 1954, B.C. Dept. of Mines, Bull. 35, (in press).
McConnell, R. G., 1887, Geol. Sur. Can. Annual Report Part D.
North, F. K., Personal communication.
Walker, J. F., 1926, Windermere Map Area, Geol. Sur. Can. Memoir 148, pp. 31-34.
Walcott, C. D., 1924, Geological Formations of Beaverfoot-Briaco Range, British Columbia, Canada, Smithsonian Misc. Coll. Vol. 75, No. 1, June 28, 1924.
Wilson, Alice E., 1926, An Upper Ordovician Fauna from the Rocky Mountains, British Columbia, Geol. Sur. of Can. Bull. 44, Geol. Series No. 46, Nov. 25, 1926, pp. 1-34.

Prepared by: K. A. Olson and J. F. Taft, Phillips Petroleum Company, Calgary, July 1954.

BEAVERHILL LAKE FORMATION: Upper Devonian

Author: Geological Staff, Imperial Oil Ltd., Western Division, 1950, Devonian Nomenclature in Edmonton Area, Alberta, Canada, Bull. A.A.P.G., Vol. 34, No. 9, pp. 1807-1825. Named from the town of Beaverhill Lake.

Type Locality: The type section well is Anglo-Canadian Beaverhill Lake #2, located in Lsd. 11, Sec. 11, Twp. 50, Rge. 17 W4. The town of Beaverhill Lake is 7 miles NW of the well.

Lithologic Characteristics: "The upper contact is placed at the change from the fragmental limestones of the Cooking Lake. . .to the argillaceous limestones of the upper part of the Beaverhill Lake formation." (Geol. Staff, Imperial Oil.)

The Beaverhill Lake represents a series of sedimentary cycles, typically three, of fragmental limestones and argillaceous limes. These cycles maintain character northward and northeastward but merge southward. There is primary anhydrite in the "2nd fragmental Zone" which may be traced eastward from the type area but is not characteristic in the fringe zone of the area of distribution. The argillaceous zones are fossiliferous and, in some cases, highly so. Prior to the first complete division of the Upper Devonian, the Cooking Lake was called the "1st Fragmental". The top of Beaverhill Lake began with the "1st Argillaceous" and continued with the "2nd Fragmental", "2nd Argillaceous", "3rd Fragmental", "3rd Argillaceous", and was completed with the "4th Fragmental", which overlies the Elk Point formation (Newland).

Thickness and Distribution: The formation is fairly uniform in thickness and is given as 722' in the type well. It is recognized in the subsurface from about Twp. 25 northward and northeastward. To the northwest into the Peace River area, the Beaverhill lake loses its character to the Green Shale section in the area of the Lesser Slave Lake.

Relation to other Units: The Beaverhill Lake is the basal section of the upper Devonian. The upper contact is conformable with the Cooking Lake member of the Woodbend formation. The nature of the lower contact is unsettled. The contact is placed, normally, where the "Fourth Fragmental" zone gives way to the evaporitic sequence of the Elk Point but some workers would place it higher and believe there is a major unconformity.

References:

Warren, P. S. & Stelck, C. R., 1950, Succession of Devonian Faunas in Western Canada, Trans. Roy. Soc. of Can., Vol. 49, Ser. 3, Sec. 4, June, pp. 61-78.
Newland, John, Personal communication.

Prepared by: K. A. Olson and J. F. Taft, Phillips Petroleum Company, Calgary, July 1954.

BIG VALLEY MEMBER: Wabamun formation, Upper Devonian

Author: Wonfor, J. S. and Andrichuk, J. M., 1953. Upper Devonian in the Stettler Area, Alberta, Canada, A.S.P.G. News Bulletin, Vol. 1, No. 9, pp. 3-6.

Andrichuk, J. M. and Wonfor, J.S., 1953. Late Devonian Geologic History in Stettler Area, Alberta, Canada, A.S.P.G. News Bulletin, Vol. 1, No. 12, pp. 3-5.

Locality: No well was designated as the type section. The Big Valley member does not outcrop in the Stettler area.

Lithologic Characteristics: "..... light colored fossiliferous limestone with minor interbeds of crystalline dolomite ..... normal marine sequence."

Thickness and Distribution: The Big Valley member is 30 to 80 feet thick in the Stettler area. The Stettler is defined to include that area between Twp. 31 and 43 and Rge. 17 to 28 W4.

Relation to other Units: The Big Valley member is underlain by the Stettler member of the Wabamun formation. It is overlain by the Exshaw formation. The authors believe a small disconformity and time break exists between the Big Valley member and the Exshaw formation.

Prepared by: R. H. Erickson, Great Plains Development Co. of Canada, Ltd., Calgary, July 1954.

BLACKFACE MOUNTAIN SHALE: Upper Devonian, Discontinued.

Author: W. A. Kelly, 1929, unpublished manuscript.

Locality: B. R. MacKay (1929) published maps of Cadomin and Mountain Park areas 52° 15' N. and 117°00' to 117°30' W. Kelly named the middle Devonian in this area.

History: The name Blackface Mountain Shale first appearedin a publication by Allen, Warren, and Rutherford (1932) who referred to Kelly's unpublished manuscript, and considered the term to be equivalent to Kindle's Miette. Abstracts by W. A. Kelly (1936 and 1939) used Blackface Mountain Shale to include what are now Perdrix and Mount Hawk formations. W. A. Kelly, in correspondence with A. H. Lang (1947), considers the Blackface Mountain Shale to be equivalent to Raymond's (1930) Perdrix and lower Boule. McLaren (1953) points out that Blackface Mountain Shale is equivalent to Perdrix as used by Allen, Warren, and Rutherford, and, since it is defined as being equivalent to Perdrix and Mount Hawk, it should be abandoned, because of its ambiguous definition.

Lithologic Characteristics: "1200' calcareous shale and argillaceous limestone" as given on Mackay's maps 1929.

Relation to other Units: Blackface Mountain Shale is equivalent to the Perdrix and Mount Hawk. It is underlain by the Flume formation and overlain by the Alexo.

References:

Allan, J. A., Warren, P. S., and Rutherford, R. L., 1932, A Preliminary Study of the Eastern Ranges of the Rocky Mountains In Jasper Park, Alberta, Trans. Roy. Soc., Canada, Sec. IV, pp. 225-248.

Kelly, W. A., Unpublished manuscript.:

Kelly, W.A., 1936, Middle and Upper Paleozoic Formations in The Canadian Rockies (Abst), Geol. Soc. Amer. Proc. pp. 380-381.

Kelly, W. A., 1939, Devonian and Mississippian Stratigraphy of Jasper Park, Alberta, (Abst) Geol. Soc. Amer. Bull., Vol. 50, p. 2000.

Kindle, E. M., 1929, The Succession of Fossil Faunas in the Eastern Part of Jasper Park, Am. Jour. Sci., 5th Ser., Vol. XVIII.

Lang, A. H., 1947, Brule and Entrance Map Areas Alberta, Geol. Surv. Canada, Mem. 244.

McKay, B. R., 1929, Mountain Park Sheet, No. 208A; Cadomin Sheet, 209A; Geol. Surv., Canada.

McLaren, D. J., 1953, Summary of the Devonian Stratigraphy of the Alberta Rocky Mountains, Alta. Soc. Pet. Geol., Field Conference Guide Book, pp. 91-92.

Raymond, P. E., 1930, The Paleozoic Formations in Jasper Park, Alberta, Am. Jour. Sci., 5th Ser., Vol. XX.

Prepared by: J. F. Taft and K. A. Olson, Phillips Petroleum Company, Calgary, July 1954.

BLACKLEAF MEMBER: Sandy member of Colorado Shale, Upper Cretaceous

Author: E. Stebinger (1918) U.S.G.S. Bull. 691E, pp. 154, 158-164.

Locality: Full exposure along Blackleaf Creek, in Birch Creek - Sun River area, Montana.

Lithologic Characteristics: An alternation of dark shales and grey to greenish grey, medium to coarse grained sandstone beds 20-75 feet thick, composing lower 600 to 700 feet of Colorado shale. Shales throughout the Blackleaf member are similar to shales higher in the Colorado, and range from hard fissile to soft poorly bedded, black to light grey. Entire member is marine.

Distribution and Thickness: Approximately 600-700 feet thick. Generally recognized throughout the southern plains area of Alberta and throughout northern Montana.

Relation to other Units: Rests on the Blairmore formation of Lower Cretaceous age and is overlain by fairly uniform dark grey shales with some concretion and bentonite beds of the upper Colorado. The Blackleaf member contains such well known units as the Fish Scale sand, Bow Island sand series and basal Colorado sand. The member is generally recognized only in the literature dealing with northern Montana and southern Alberta.

References:

Russell and Landes (1940) Geology of the Southern Alberta Plains, G.S.C. Memoir 221, p. 25.
Dobbin and Erdmann (1934) Problems of Petroleum Geology, p. 712.

Prepared by: British American Oil Company Ltd., Calgary, July 1954.

BLACKSTONE FORMATION: Upper Cretaceous

Author: Malloch, G. S. (1911) Bighorn Coal Basin, Alberta, Geol. Survey of Canada, Memoir 9E, pp. 35-36.

Locality: None designated, but within the Bighorn Basin. Well exposed along south branch of Wapiabi Creek, Twp. 40, Rge. 17 W5.

Lithologic Characteristics: Homogeneous dark grey calcareous shales in type area; develops sandy silty character to the south, with zones of rusty weathering sandy shales and sandstones separated by brown weathering black shales which may be slightly sandy and contain ironstone concretions.

Thickness and Distribution: Thickness varies from approximately 1700 feet in the type locality to 400 feet in the southern foothills. Recognized from central Alberta foothills area to southern Alberta foothills area.

Relation to other Units: Generally rests on the sands and shales of the Blairmore formation (Lower Cretaceous) but is underlain by Crowsnest Volcanics in the Crowsnest Pass area. Overlain by rusty weathering arenaceous shales and very hard resistive brown weathering silicious sands and shaly sands of the Cardium (Bighorn Formation). Equivalent to Lower Alberta (Benton) shales of southern foothills area.

References:

Hage, C. O. (1940) Beaver Mines, G.S.C. Map 739A.
Beach, H. H. (1943) Moose Mountain and Morley Map Areas, Alberta, G.S.C. Memoir 236, pp. 41-43.
Fox, F. G. (1953) A.S.P.G. Third Annual Field Conference and Symposium, p. 203.
MacKay, B. R. (1943) Foothills Belt of Central Alberta, G.S.C. Paper 43-3.

Prepared by: British American Oil Company Ltd., Calgary, July 1954.

BLAIRMORE FORMATION: Lower Cretaceous

Author: Leach, W. W., 1912, Map 107A, Blairmore Alberta, Geological Survey of Canada, Summary Report 1912, P. 234. Name derived from town of Blairmore, Alberta in the Crowsnest Pass.

History: Cairnes, D. D. (1908) described the rocks overlying the Kootenay and underlying the Benton marine shales as "Dakota". Thus he implied that these strata were Upper Cretaceous. Leach, W. W. (1911) again applied the name "Dakota", but queried its use because he realized these strata were Lower Cretaceous in age. The following year, his map on the Blairmore area was published. On this map he used the name Blairmore in referring to the formation formerly called Dakota. In the immediately following years various authors recognized the name Blairmore, i.e. Dowling, D. B. 1914, McLearn, F. H. 1915, Stewart, J. S. 1915, Rose, B. 1916.

Location of Type Section: None designated, but Leach while working in the Blairmore Area in 1911, measured what he described as a complete section near Ma butte Mountain. Ma butte is approximately 6½ miles due north of Carbondale, Alberta.

Lithological Characteristics: Leach, W. W., 1911, "The Dakota? (now Blairmore) consists essentially of sandstones, varying greatly in color and texture, with one thin bed of bluish-grey limestone towards the middle of the series, which on account of its persistent nature, serves as a most useful marker horizon". "Generally speaking the lower beds up to the limestone are light in color, usually greenish in tint and weathering yellowish. These are followed by several hundreds of feet of strata in which calcareous beds predominate, while the upper members are dark in color, green being the prevailing tint, although the dark red patches are very noticeable. They are always soft and readily weathering, breaking up into small angular fragments". Leach also described a hard siliceous, cherty conglomerate at the top of the Kootenay formation. This conglomerate is now considered to form the base of the Blairmore formation.

Thickness and Distribution: The Blairmore varies widely in thickness ranging from 6500 feet in the mountains to only a few hundred feet on the plains. In the Ma butte section the Blairmore is 2865 feet thick. It is widely distributed under the western plains, being present in the northern central and southern areas of Alberta; the central and southern area of Saskatchewan; and the southern area of Manitoba.

Relation to other Units: The Blairmore lies unconformably (?) upon the Kootenay formation (Upper Jurassic ?). Going eastward into the plains the Blairmore lies successively on the eroded older Jurassic strata and farther east on eroded Paleozoic strata. Above the Blairmore are the marine shales of the Blackstone formation. In the Blairmore area, the Blairmore is overlain by Crowsnest Volcanics.

References:

Cairnes, D. D. (1908) Moose Mountain District Southern Alberta, Second edition, Geol. Sur. Can., Memoir 61, 1915, pp. 29 and 30.

Leach, W. W. (1911) Geology of Blairmore Map area, Alberta, Geol. Sur. Can., Summary Report 1911, pp. 195-196.

Leach, W. W. (1912) Map 107A "Blairmore, Alberta" Geological Survey of Canada, Summary Report 1912, p. 234.

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Dowling, D. B. (1914) Geol. Sur. Can., Summary Report 1914, pp. 46 and 47.
McLearn, F. H. (1915) Jurassic and Cretaceous of Crowsnest Pass, Alberta, Geol. Sur. Can., 1915, p. 112.
Stewart, J. S. (1915) The Disturbed Belt of Southwest Alberta, Geol. Sur. Can., pp. 113-114.
Rose, B. (1916) Crowsnest Coal Fields, Alberta, Geol. Sur. Can., pp. 110 and 111.
MacKay, B. R. (1933) Geol. Sur. Can., Summary Report 1933, Part B, p. 10b.
Beach, H. H. (1943) Moose Mountain and Morley Map Areas, Geol. Sur. Can., Memoir 236, pp. 38 and 39.

Prepared by: R. J. Flower, California Standard Company, Calgary, July 1954.

BLOOD RESERVE SANDSTONE: Upper Cretaceous, Maestrichtian age

Author: Russell, L. S., 1931, Stratigraphy and Structure of the Eastern Portion of the Blood Indian Reserve, Alberta. Geological Survey of Canada, Summary Report 1931, Pt. B, p. 32.

Locality: Sections 23 and 24, Township 6, Range 23, West of the 4th Meridian.

History: The name Blood Reserve sandstone was proposed by Russell to apply to the sandstone beds overlying the Bearpaw shales in south-western Alberta, equivalent to the Horsethief sandstone designated by Stebinger in Glacier County, Montana. Prior to 1931, the Blood Reserve sandstone had been referred to as the Fox Hills sand. Paleontological evidence indicates a pre-Fox Hills age. (Russell and Landes, 1940, p. 84).

Lithologic Characteristics: Massive, medium grained sandstone. Light grey or buff in color, weathering to a buff, yellow or greenish tinge. The cement varies from calcareous to argillaceous. Cross-bedding and irregular concretions are common. The sandstone varies from hard to soft, often weathering in castellated form.

Thickness and Distribution: The Blood reserve sandstone thins rapidly northward from a thickness of approximately 80 feet in the locality of the type section, to about 40 feet on the Oldman River, near the village of Monarch, in Section 31, Township 9, Range 23 W4th Meridian. It is not present east of the Sweetgrass Arch.

Relation to other Units: It is underlain by the marine Bearpaw shales, and marks the initial phase of the brackish and continental sediments of the St. Mary River formation. The contact with the underlying Bearpaw shales varies from sharp to transitional. .there is no apparent break in sedimentation shown by the upper or lower contacts.

Correlation: The Blood Reserve sandstone is correlated with the Horsethief sandstone of Montana.

References:

Russell, L. S. and Landes, R. W., 1940, Geology of the Southern Alberta Plains, Geol. Sur. Can., Memoir 221, p. 82.

Thompson, R. L. and Axford, D. W., 1953, A.S.P.G. Field Conference and Symposium Guide Book, p. 55.

Prepared by: O. Gietz, California Standard Company, Calgary, July 1954.

BLUESKY FORMATION: Fort St. John group, Lower Cretaceous

Author: Workman, L. E. et al, 1952, Lower Cretaceous of the Peace River Region, A.S.P.G. Study Group Report.

Locality: Shell B.A. Bluesky No. 1 in 4-29-81-1 W6, between 2736' and 2810'.

Lithologic Characteristics: Brown to brownish grey, fine to medium grained, usually glauconitic, partly calcareous or sideritic, salt and pepper sandstone with fair porosity. Chert granules and pebbles occur near the top. There may be thin shale interbeds, and in the East Peace River region the formation includes a basal dark grey shale with ostracods. Northeast of Peace River town the sandstone is saturated with tarry oil.

Thickness and Distribution: 0' to 150', Peace River plains subsurface. It thickens irregularly southwestwards from the zero onlap edge in the Cadotte River area (township 87, range 18 W5) to 150' in the Pouce Coupe area. It thins from there to the south and southeast.

Relation to other Units: Rests conformably on sandstones, shales and coals of the Bullhead Group (Lower Cretaceous) and overlaps on to limestones and shales of the Rundle formation (Mississippian) north and east of Peace River town. Overlain conformably by the Wilrich marine shale member of the Spirit River formation (Lower Cretaceous). The basal shale correlates with the Metacypris angularis ("ostracod") zone of the Edmonton area, and the sandstone with the "glauconitic sand" of the Athabasca and Edmonton areas.

References:

Badgley, P. C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, G.S.C. paper 52-11.

Prepared by: J. Law, The California Standard Company, Calgary, July 1954.

BONANZA SANDSTONE: Fort St. John group, Lower Cretaceous

Author: Pacific Petroleums usage, 1951.

Locality: Sunrise gasfield, 10 miles northwest of Dawson Creek, B.C., Twps. 78 to 79, Rngs. 16 to 17 W6.

History: Gunning, H. C., 1931, used this name for Upper Triassic and Lower Jurassic (?) rocks on Vancouver Island. This usage has precedence.

Lithologic Characteristics: Very fine to coarse, mainly fine, partly calcareous, partly sideritic, locally glauconitic, salt and pepper sandstone with fair to good porosity. Chert pebbles occur near the top.

Thickness and Distribution: 250', Sunrise gasfield only.

Relation to other Units: Rests conformably on the Harmon shale of the Peace River formation and is overlain with apparent conformity by the Shaftesbury shale formation (see Cadotte). The Bonanza is equivalent to the Paddy plus Cadotte of the general Peace River region.

References:

None published on Sunrise usage.
G.S.C. Summary report, 1931, part A deals with Vancouver Island usage of Gunning.

Prepared by: J. Law, The California Standard Company, Calgary, July 1954.

BORRADAILE MEMBER: Manville formation (Blairmore), Lower Cretaceous

Author: Nauss, A. W., 1945, Cretaceous Stratigraphy of the Vermilion Area, Alberta, Canada, American Association Petroleum Geologists Bull., Vol. 29, No. 11, pp. 1609-1612, 1615, 1627.

Locality: Northwest Manville No. 1, Lsd. 1, Sec. 8, Twp. 50, Rge. 8 W4. Samples and cores available at Imperial Oil Limited.

Lithologic Characteristics: Well sorted and rounded, fine to medium grained sand and sandstone, with grey shale and siltstone. The sandstone is cross-bedded, and spherical pyrite nodules are common. The shale contains woody plant fragments.

Thickness and Distribution: In the type section, the Borradaile member is 29 feet thick. Northward, the member attains a maximum known thickness of 60 feet in the Borradaile oil field.

Relation to other Units: Overlies sandstone, siltstone and shale of the Tovell member, and is overlain by sandstone, shale, silt, and coal of the O'Sullivan member. All members are of the same formation.

References:

Wickenden, R.T.D., 1948, The Lower Cretaceous of the Lloydminster Oil and Gas Area, Alberta and Saskatchewan, Geological Survey of Canada, Paper 48-21.

Badgley, P. C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geological Survey of Canada, Paper 52-11.

Prepared by: D. G. Crosby, The California Standard Company, Calgary, July 1954.

BOSWORTH FORMATION: Upper Cambrian.

Author: Walcott, C.D. (1908), Nomenclature of Some Cambrian Cordilleran Formations, Smithsonian Misc. Coll., Vol. 35, No. 1, pp. 2-3.

Type Locality: South side of Mount Bosworth on the Continental Divide above Kicking Horse Pass.

Lithologic Characteristics: Alternating bands of thick shaly layers, and thin layers of dolomitic limestone, with 48 feet of intercalated siliceous shale, forming a series 1,587 feet thick on Mount Bosworth.

Thickness and Distribution: At the type locality on Mount Bosworth 1,587 feet. Thinner elsewhere and absent by non-deposition in places. Confined largely to the central area of the Cordilleran Geosyncline. It thins rapidly eastward and changes in character to the northwest. Not recognizable in Glacier Lake section. The southeast limit is unknown.

Relation to Other Units: At Mount Bosworth the Paget overlies and the Arctomys underlies the Bosworth formation. Fauna consists of trilobite fragments and rare Obolus. Deiss reports colitic limestone with occasional Girvanella.

References:

Deiss, C. (1939), Cambrian Formations of Southwestern Alberta and Southeastern British Columbia, Bull. Geol. Soc. Amer., Vol. 50, pp. 1010-1011.

Fox, F.G. (1953), Glossary of Formation Names of Southwestern Alberta, Alberta Soc. Petrol. Geol., Third Ann. Field Conf. and Symp., Guide Book, p. 190.

Walcott, C.D. (1928), Cambrian Geology and Paleontology, No. 5: Pre-Devonian Paleozoic Formations of the Cordilleran Provinces of Canada, Smithsonian Misc. Coll., Vol. 75, No. 5, pp. 243-244.

Prepared by: R. A. Briggeman, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

BOULE FORMATION: Upper Devonian. Discontinued. Derived from Boule Range, Jasper Park, Alberta.

Author: Raymond, P. E., 1930, The Paleozoic Formations in Jasper Park, Alberta, Am. Jour. Sci., 5th Ser., Vol. XX.

Locality: Roche Miette, 25 miles northeast of Jasper town, Alberta.

History: Raymond divided the Devonian into seven lithologic zones at Roche Miette and called zones 3 and 4 the Boule formation. Later workers: Allen, Warren, and Rutherford (1932), Lang (1947), and Fox (1951), showed that due to faulting part of the division was invalid. Use of the formation name was continued by A. H. Lang (1947). F. G. Fox, 1951, pointed out that the Boule formation as described by Raymond contains two cartographic units, namely zone 3 and part of the Palliser. He proposed adoption of the name Cheviot for Raymond's lithologic zones 3 and 6 which are essentially the same. de Wit and McLaren (1950) divide the Cheviot into Mount Hawk and Alexo formations.

Lithologic Characteristics: The Boule formation as described by Raymond at Roche Miette contains:

Zone 3 - 400' Impure shaly and nodular limestones with very numerous fossils. Well exposed below the massive limestone in Roche Miette.

Zone 4 - 1200' Massive thick bedded limestone showing more or less alteration to dolomite along "fucoidal" streaks. Forms the massive cliffs in Roche Miette.

Relation to other Units: The lower Boule (Raymond's Zone 3) is equivalent to Fox's Cheviot, and to the Mount Hawk and Alexo formations of de Wit and McLaren. It is underlain by the Perdrix and overlain by the Palliser formations. The upper Boule (zone 4) is equivalent to part of the lower Palliser.

References:

Allan, J. A., 1932, Warren, P. S., and Rutherford, R. L., A Preliminary Study of the Eastern Ranges of the Rocky Mountains in Jasper Park, Alberta, Trans. Roy. Soc., Canada, Sec. IV, pp. 225-248.

Lang, A. H., 1947, Brule and Entrance Map Areas, Alberta, Geol. Surv. Canada, Mem. 244.

McLaren, D. J., 1953, Summary of the Devonian Stratigraphy of the Alberta Rocky Mountains, Alta. Soc. Pet. Geol., 1953, Field Conference Guide Book, pp. 91-92.

Fox, F. G., 1951, Devonian Stratigraphy of the Rocky Mountains and Foothills between Crowsnest Pass and Athabaska River, Alberta, Canada, Bull. A.A.P.G., Vol. 35, No. 4, pp. 822-843.

de Wit, R. and McLaren, D. J., 1950, Devonian Sections in the Rocky Mountains between Crowsnest Pass and Jasper, Alberta, Geol. Sur. Can., Paper 50-23.

Prepared by: J. F. Taft and K. A. Olson, Phillips Petroleum Company, Calgary, July 1954.

BOW ISLAND FORMATION: Colorado group, Upper Cretaceous period. The term "formation" was used in an unpublished paper "Colorado Stratigraphy of Southern Alberta" by F. G. Lines and presented to the A.S.P.G. in January of 1953.

Derivation and Author: Unknown, but assumed to be named after the Bow Island No. 1 well drilled by the Canadian Pacific RR in 1908. The discovery well is 3 1/2 miles northwest from the town of Bow Island.

Locality: Lsd. 6, Section 15, Township 11, Range 11, W 4th Meridian.

Lithology: Sandstone - grey to white, salt and pepper, quartzose with scattered chert pebbles, fine grained, loose, porous, bentonitic matrix. The sands grade into dark grey, micromicaceous, massive Colorado shale.

Thickness and Distribution: The Bow Island is a wide-spread sand series in the lower part of the Colorado group. In the general Bow Island area the interval Base of "Fish Scale" Zone - Top of Blairmore is some 575 feet in thickness and an aggregate thickness of 80 feet of sand is present. The sand thickness decreases to zero to the northeast and reaches a maximum thickness of 140 feet in the Lethbridge area to the west. This formation has been subdivided into the Bow Island Nos. 1, 2 and 3 Sand members, depending on the occurrence and distribution of these somewhat lenticular sand bodies below the Mowry zone and above the Blairmore. Caution should be used in correlating the individual sands of the Bow Island formation as the lenticularity of the sands allows positive correlation over limited distances only. The numbering of the sands should be used locally in restricted areas of close control, as sand frequencies as high as five have been noted.

Relation to other Units: The Bow Island formation is the correlative of the Viking formation of Saskatchewan and Central Alberta, and a marine to brackish water equivalent of the continental Upper Blairmore section found in the Disturbed Belt to the west. The Bow Island formation lies in the lower portion of the Blackleaf.

The Bow Island formation is overlain by the "Fish Scale" zone, and underlain by the Top of the Blairmore.

Prepared by: G. D. Grant, California Standard Company, Calgary, July 1954.

BRAZEAU FORMATION: Upper Cretaceous

Author: Malloch, G. S., 1911, Bighorn Coal Basin, Alberta, Geological Survey Canada, Memoir 9-E, pp. 21-22, 37-38, 45-46.

Locality: On the Brazeau River at the northwestern end of the Bighorn Coal Basin.

History: At the type locality the top of the formation has been removed by erosion, and strata present are equivalent to the Belly River and perhaps the basal part of the Edmonton to the southeast in the foothills. The formation has been extended by later workers in foothills areas to the northwest to include higher beds, so that the formation as presently defined includes strata equivalent to both the Belly River and Edmonton formations and is overlain by strata of probable Paleocene age. The Brazeau thus includes strata included by Allan and Rutherford in the Saunders formation.

Lithologic Characteristics: Interbedded sandstone, shale, and pebble-conglomerate, with a few bentonitic beds and coal seams. The sandstone is green to grey, fine to coarse grained, commonly crossbedded, and in part has a salt and pepper appearance due to black chert and lignitic fragments. The shale is grey to greenish grey and in part sandy. The conglomerate, which is most abundant in the lower part of the formation, consists of pebbles of quartzite and chert in a sandstone matrix. At the base of the formation 80-100 feet of fine grained, greenish grey sandstone has been designated the Solomon member by Lang (1947). With the exception of the Solomon member the formation is non-marine in nature.

Thickness and Distribution: In the type section Brazeau strata constitute a thickness of 1680 feet, but the upper part of the formation has been removed by erosion. In the foothills to the northwest, the upper limit of the Brazeau formation has been defined and the formation is about 6000 feet thick. The Brazeau is confined to the disturbed belt of Central Alberta, being equivalent to the Belly River and Edmonton to the southeast and to strata within the Wapiti formation to the northwest.

Relation to other Units: As presently defined, the Brazeau formation overlies marine shales of the Wapiabi formation and is overlain by sandstone, shale, conglomerate, and coal of probable Paleocene age.

References:

MacKay, B. R., 1930, Trans. Can. Inst. Min. and Met., Vol. 33, p. 473.
Allan, J. A. and Rutherford, R. L., 1934, Geology of Central Alberta, Alta. Research Council, Report 30, p. 34.
Lang, A. H., 1947, Brule and Entrance Map - areas, Alberta, Geol. Surv. Canada, Memoir 244.

Prepared by: D. G. Crosby, The California Standard Company, Calgary, July 1954.

BULLHEAD GROUP: Lower Cretaceous (and Upper Jurassic?)

Author: McLearn, F. H., 1918, Peace River Section, Alberta, G.S.C. Summary Report, 1917, Part C.

Locality: Bullhead Mountain, 6 miles west of Hudson Hope, British Columbia.

History: McLearn used the name Bullhead Mountain formation for strata between the Fort St. John group (Lower Cretaceous) and the Triassic, not including the Jurassic shales. Wickenden and Shaw changed this to Bullhead group in 1943.

Lithologic Characteristics: Non-marine grey sandstone, dark grey shale, conglomerate and coal (Gething plus Upper Dunlevy) overlying marine grey sandstone and dark grey shale (Lower Dunlevy of eastern foothills, Monach, Beattie Peaks and Monteith of Western foothills, and possibly Nikanassin of Peace River subsurface.)

Thickness and Distribution: 0' to 7850', Peace River foothills and subsurface of plains. Absent northeast of Cadotte River area (Twp. 87, Rge. 18 W5). Thickens irregularly southwestwards from this area to the foothills.

Relation to other Units: Rests unconformably (?) on Nikanassin sandstones (Lower Cretaceous or Upper Jurassic), or conformably on Fernie (Jurassic) shale if the Nikanassin is included in the Bullhead, and is overlain conformably by the Moosebar shale formation (Lower Cretaceous) in the Foothills, or by the Bluesky sandstone formation (Lower Cretaceous) in the Plains subsurface. The group is probably equivalent in part to the Kootenay formation of southwestern Alberta and to the McMurray formation of the Athabaska area.

References:

McLearn, F. H., 1923, Peace River Canyon Coal Area, B.C., G.S.C. Summary Report, 1922, Part B.

Wickenden, R.T.D. and Shaw, G., 1943, Stratigraphy and Structure in Mt. Hulcross - Commotion Creek Map Area, B.C., G.S.C. Paper 43-13.

Beach, H. H. and Spivak, J., 1944, Dunlevy - Portage Mt. Map Area, B.C., B.S.C. Paper 44-19.

Mathews, W. H., 1947, Geology and Coal Resources of the Carbon Creek - Mt. Bickford Map Area, 1946, B.C. Department of Mines Bulletin No. 24.

Prepared by: J. Law, The California Standard Co., Calgary, July 1954.

CADOMIN CONGLOMERATE: Kootenay group, Lower Cretaceous

Author: McKay, B. R., 1928, Brule Mines Coal Area, Alberta, Department of Mines Summary Report, 1928, Part B.

Locality: Railway cut at Cadomin, Mountain Park area, 40 miles southeast of Brule.

Lithologic Characteristics: Massive, resistant conglomerate composed of flattened and well rounded pebbles of black, white and green chert, white and grey quartzite and quartz which range in size from ¼" to over 3". The pebbles are firmly cemented in a coarse sandy matrix.

Thickness and Distribution: 5' to 70', average 25', Mountain Park, Cardinal River and Cadomin map areas, and at Folding Mountain (8 miles southeast of Brule). A conglomerate in the Bullhead group of the Peace River region subsurface is also called "Cadomin" and may be equivalent.

Relation to other Units: Rests unconformably on shales and sandstones of the Mikanassin formation (Lower Cretaceous and Upper Jurassic), and is overlain conformably by shales, sandstones and coals of the Luscar formation (Lower Cretaceous). The conglomerate is probably equivalent to the basal Blairmore conglomerate of the Crowsnest Pass and to the Dalhousie conglomerate of the Highwood area.

References:

Alberta Study Group, 1954, Lower Cretaceous of the Peace River Region, Western Canada Sedimentary Basin, Amer. Assn. Petrol. Geol., Tulsa, Okla.

Prepared by: J. Law, The California Standard Company, Calgary, July 1954.

CADOTTE MEMBER: Peace River formation, Lower Cretaceous

Author: McLearn, F. H., 1944, Revision of the Lower Cretaceous of the Western Interior of Canada, G.S.C. paper 44-17.

Locality: No type section. A.S.P.G. Study Group, 1951, suggests Wickenden's 1951 section on the north side of a small tributary valley to Peace River, about 150 yards from the water's edge, on the west side of Peace River in N.E. ¼ of section 25 or S.E. ¼ of section 26-85-21 W5.

History: McLearn included the overlying continental sandstone in his definition. Wickenden restricted the name to the marine member. This is the present usage.

Lithologic Characteristics: Grey to light grey to greenish grey, fine to very fine grained, friable to firm, locally calcareous or sideritic, often glauconitic, salt and pepper sandstone with good porosity. Rare chert pebbles occur. The sandstone is best developed in the Peace River town-Pouce Coupe-Grande Prairie area. It is sometimes interbedded with dark grey marine shale and silt, especially outside this area, and north of township 93 the sandstone is absent.

Thickness and Distribution: 30' to 170' commonly 80' ±, Peace River region. No regular variation but is generally thinner east of the 6th Meridian than west of it. Occurs in the subsurface throughout the Peace River region and outcrops along Peace River, north of Peace River town.

Relation to other Units: Rests conformably on the Harmon marine shale member of the Peace River formation and is overlain disconformably by the Shaftesbury marine shale formation (Lower Cretaceous) north of township 88, and conformably, or possibly disconformably (Wickenden) by the Paddy continental sandstone member of the Peace River formation south of township 88.

References:

Wickenden, R.T.D., 1951, Some Lower Cretaceous Sections on Peace River Below the Mouth of Smoky River, Alberta, G.S.C. paper 51-16.

Workman et al, 1952, Lower Cretaceous of the Peace River Region, A.S.P.G. Study Group Report.

Badgley, P. C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, G.S.C. Paper 52-11.

Prepared by: J. Law, The California Standard Company, Calgary, July 1954.

CALMAR MEMBER: Winterburn formation, Minnewanka group, Upper Devonian

Author: Geological Staff, Imperial Oil Limited, Western Division, 1950, Devonian Nomenclature in Edmonton Area, Alberta, Canada, Bull. Amer. Assoc. Petrol. Geol., Vol. 34, No. 9, pp. 1808-1809, 1813-1815.

Locality: Type well, British American Pyrcz No. 1, Lsd. 12, Sec. 25, Twp. 50, Rge. 26, W4 M., Alberta, Canada. Depth 4865 to 4909 feet.

Lithology: In the type section the Calmar member is composed of mottled red and green quartz siltstone in part dolomitic, with small anhydrite filled vugs. Elsewhere the coloration may be light brown, grey-green or grey depending upon dolomitic and argillaceous associations. Towards Lesser Slave Lake increasing quantities of green shales and dolomites accompanied silt deposition. In the areas of Majeau Lake and Lac Ste. Anne the Calmar equivalent begins to be strongly argillaceous. To the south the equivalent is rapidly replaced by silty dolomites and anhydrites.

Thickness and Distribution: The Calmar member is 44 feet thick in the type section. To the east and northeast pre-Cretaceous erosion truncates the unit in the Calling Lake, Redwater and Beaverhill Lake areas. Northward toward Lesser Slave Lake, the Calmar may thin to 15 feet and less, but the increased siltiness of the Winterburn formation renders exact correlations questionable. West of the Fifth Meridian the Calmar equivalent thickens with an increasing argillaceous content -- exact definition from the underlying shale facies of the Nisku is difficult. To the south the unit shows variable thinning occurring from 30 to less than 10 feet thick; the extreme limit in this direction is still questioned, but the Calmar does not appear to cross the Southern Alberta Reef Complex.

Relation to other Units: The Calmar member is enclosed in the Winterburn formation, resting on the buff dolomites and other facies of the Nisku member and overlain by the buff silty dolomites and anhydrites of the Graminia member.

References:

Andrichuk, J. M. and Wonfor, J. S., 1953, Late Devonian Geologic History in Stettler Area, Alberta, Canada, Alta. Soc. Petrol. Geol. News Bull. Vol. 1, No. 12, pp. 3-5.

Belyea, Helen R., 1952, Notes on the Devonian System of the North-Central Plains of Alberta, Geol. Surv. Canada Paper 52-27, pp. 1-66, 4 figs.

Belyea, Helen R., 1954, Further Discussion on the Use of the Term Nisku, Alta. Soc. Petrol. Geol. News Bull. Vol. 2, No. 1, pp. 3-4.

de Wit, R. and Mclaren, D. J., 1950, Devonian Sections in the Rocky Mountains Between Crowsnest Pass and Jasper, Alberta. Geol. Surv. Canada Paper 50-23, pp. 1-66, 1 fig.

Prepared by: J. N. Stephen and H. T. Hornford, Richfield Oil Corporation, Calgary, July 1954.

CARDIUM FORMATION: Colorado group, Upper Cretaceous

Author: Cairnes, D. D., (1907) Moose Mountain District of Southern Alberta, Geol. Surv., Can., Pub. No. 968, 2nd Ed. 1914, Geol. Surv. Can., Memoir 61.

Locality: No specific section designated. Generalized section along Bow River near the mouth of Oldfort Creek.

History: Cairnes (1907, pp. 28, 29) states, "Specimens of Cardium pauperculum are so plentiful in this sandstone series that Dr. Hector, in 1858, called the whole shale series along the Bow River, including the Claggett and Niobrara-Benton, the Cardium shales. Farther south this sandstone series, which for convenience I shall call the Cardium sandstones, is not so prominent, ..."

In a search for Hector's work, two papers were unearthed. The first, published in 1859, was later embodied in the second, which was published in 1863. They have rather involved titles which I include here for historic interest.

1. "Papers Relative to the Exploration by Captain Palliser of that Portion of British North America which lies between the Northern Branch of the River Saskatchewan and the Frontier of the United States, and between the Red River and the Rocky Mountains", London, 1859.

2. "Exploration - British North America. The Journals, Detailed Reports, and Observations relative to the Exploration, by Captain Palliser of that Portion of British North America which in latitude lies between the British Boundary Line and the Height of Land or Watershed of the Northern or Frozen Ocean respectively, and in longitude, between the Western Shore of Lake Superior and the Pacific Ocean, during the years 1857, 1858, 1859, and 1860." H.M. Stationery Office, 1863.

In perusal of these volumes, no reference could be found to "Cardium Shales". Hector does mention the shales along the Bow River and mentions the genus Cardium several times. In particular he refers to "Septaria Clays", containing nodules which when broken open were found to contain Cardium sp. among other fossils. No detailed descriptions are given in his work. Although he may have applied the term Cardium to these beds, its usage was restricted by Cairnes to include only the sandstone members, and therefore the name as it is used today was defined by Cairnes.

Lithologic Characteristics: Described by Cairnes to consist of three sandstone members separated by dark shales as follows:

Upper sandstone bed	70'
Dark shales with a few calcareous sandstone layers	60'
Middle sandstone bed with 18 inches of conglomerate at top	30'
Dark shales	20'
Lower sandstone bed, conglomerate at top, considerable amounts of intercalated dark shales	40'

The fossil Cardium pauperculum is apparently not restricted to the Cardium sandstones, nor is it common except at a few localities where it is found in abundance in lenses at the top of the middle sandstone member. Beach, 1943, states "The Cardium formation consists of three, and locally two, sandstones interbedded with rusty weathering, sandy shales".

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Thickness and Distribution: Thickness varies from 0 to over 440 feet. It has been reported (Rose, 1919) as far south as Township 14 in the foothills and Township 17 in the mountains. It has been correlated with the Bighorn, and, probably incorrectly with the Badheart to the north.

Relation to other Units: Rests conformably on the Lower Alberta Shale (Blackstone). Is conformably overlain by the Upper Alberta Shale (Wapiabi).

References:

Cairnes, D. D. (1906), The Foothills of the Rocky Mountains South of the Main Line of the Canadian Pacific Railway", Summ. Rept., Geol. Surv. Dept., Canada, for Calendar Year of 1905.

Cairnes, D. D. (1907), Moose Mountain District of Southern Alberta, Geol. Surv., Can., Pub. No. 968; 2nd Ed. 1914, Geol. Surv., Can. Memoir 61.

Malloch, G. S. (1909), The Big Horn Coal Basin, Summ. Rept. Geol. Surv. Br., Dept. of Mines, Can., for Calendar Year of 1908.

Malloch, G. S. (1911), Bighorn Coal Basin, Alberta, Geol. Surv. Br., Dept. of Mines, Can., Memoir 9E.

Rutherford, R. L. (1927), Geology along the Bow River between Cochrane and Kananaskis, Alberta, Sci. and Ind. Res. Coun., Alberta., Rept. No. 17.

Rose, Bruce (1919), Highwood Coal Area, Alberta., Geol. Surv. Br., Dept. of Mines, Summ. Rept. 1919, Part C.

Hume, G. S. (1930), The Highwood-Jumpingpound Anticline, with Notes on Turner Valley, New Black Diamond, and Priddis Valley Structures, Alberta, Dept.of Mines Summ. Rept., 1929, Part B.

Beach, H. H. (1943), Moose Mountain and Morley Map Areas, Alberta, Geol. Surv. Can. Memoir 236.

Hage, C. O. (1943), Dyson Creek Map Area, Alberta, Geol. Surv. Can. Paper 43-5.

Prepared by: K. A. Harris, The California Standard Company, Calgary, July 1954.

CHEVIOT FORMATION: Devonian

Author: The name was first applied by Kelly in an unpublished manuscript and later defined by Fox, F. G. (1951), Devonian Stratigraphy of the Rocky Mountains and Foothills between Crowsnest Pass and the Athabaska River, Alberta, Canada, Bulletin A.A.P.G., Vol. 35, pp. 822-843.

Type Locality: Mt. Cheviot, just West of Mountain Park, Alberta. (Twp. 45, Rge. 24 W5 M.)

Lithology: Upper part consists of grey silty limestones and dolomites, brecciated in part, and fine grained sandstone and siltstones. Lower part consists of well-bedded medium grey clastic limestones and dolomites which become very platy towards the base; massive structureless, light grey limestones and dolomites in broad lenticular "reef-like" bodies; dark grey to black argillaceous, somtimes brecciated, limestones and dolomites.

Thickness: 370' - 1020'.

Distribution: Jasper area and Rocky Mountains to the south. It appears in part correlative with the upper Fairholme formation of the Banff area.

Relation to other Units: Rests on the Pardrix shale in the "off-reef" sequence and on the Flume formation in the "reef" sequence. The Cheviot is overlain transitionally by the Palliser formation.

Remarks: It is the writer's opinion that the term Cheviot should be discarded or elevated to a group status covering the Alexo and Mt. Hawk formations of de Wit and McLaren. The break between the Mt. Hawk (Lower) and the Alexo (upper) is easily recognizable in the field and represents an important change in the Devonian lithology.

References:

McLaren, D. J. (1953), Summary of the Devonian Stratigraphy of the Alberta Rocky Mountains, A.S.P.G. Field Conference Guide Book, pp. 89-104.

Prepared by: Bob Stevenson, Royalite Oil Company, Ltd., Calgary, July 1954.

CHINOOK MEMBER: Wapiabi formation, Upper Cretaceous

Author: Gleddie, Joseph, 1949, Upper Cretaceous in Western Peace River Plains, Alberta, American Association Petroleum Geologists Bull., Vol. 33, No. 4, pp. 511, 523-524.

Locality: Gorge of Fish Creek about ½ mile above the junction with the Wapiti River, in the outer foothills belt.

Lithologic Characteristics: Sandstone and sandy shale, containing glauconite.

Thickness and Distribution: In the type section the Chinook member is 75 feet thick. The member thins eastward and is only about 10 feet thick on the Smoky River.

Relation to other Units: The Chinook is included within marine shale of the Wapiabi formation. The top of the member is 90-100 feet below the basal sandstone of the Wapiti formation, which overlies the Wapiabi formation. The interval of the Wapiabi above the Chinook is transitional in nature with the overlying Wapiti formation, consisting of shale and sandy shale.

Prepared by: D. G. Crosby, The California Standard Company, Calgary, July 1954.

CLEARWATER SHALE: Lower Cretaceous

Author: McConnell, R. G., 1893, Report on a Portion of the District of Athabaska Comprising the Country between Peace River and Athabaska River North of Lesser Slave Lake, Geol. Surv. Canada, Vol. 5, Pt. D., pp. 30D-32D, 55D-58D.

Locality: Eight miles below the Grand Rapids at Pte. La Biche on the Athabaska River (approximately the S.E. corner Twp. 86, Rge. 18 W4). Good exposures along the Clearwater River.

Lithologic Characteristics: Soft, dark lead grey shale and clays and a considerable proportion of greyish sandstone, greenish glauconitic sandstone and ironstone.

Thickness and Distribution: 275 feet in the general Fort McMurray area.

Relation to other Units: Rests on the massive bituminous sandstone of the McMurray formation (Lower Cretaceous) and is overlain by the soft yellowish sandstone of the Grand Rapids formation (Lower Cretaceous).

References:

McLearn, F. H., 1916, Athabaska River Section, Geol. Surv. Canada Sum. Report 1916, p. 146.

Badgley, P. C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geol. Surv. Canada Paper 52-11.

Prepared by: W. S. Bannister, The California Standard Company, Calgary, July 1954.

COAL SAND: Lower Cretaceous

Author: Not known. Probably a drillers term that was adopted and used. P. D. Moore may have been the first geologist to use the name in well logging.

Location of Type Section: The Coal Sand has been recognized only in the subsurface within the limits of the Turner Valley oil field. No particular well has been designated as the type section.

Lithologic Characteristics: Light grey quartzitic sandstone composed of very fine, angular grains. It is invariable calcareous. In most wells it occurs just below a thin coal seam and in some wells thin lentals and fragments of carbonaceous material occur within the sand itself.

Distribution and Thickness: The Coal Sand has been recognized only within the limits of the Turner Valley field. It is best developed in the southern part of the field, where it reaches a maximum thickness of about 15 feet.

Relation to other Units: The Coal Sand occurs in the lower part of the Upper Blairmore about 150 to 300 feet above the Home Sand, and between 200 and 600 feet below the top of the Blairmore. It occurs within a brackish water facies in the Upper Blairmore.

References:

Schedule of Wells drilled for Oil and Gas to 1938, by F. K. Beach. Department of Lands and Mines of the Province of Alberta.
Gallup, W. B. - Personal communication.
Stevenson, J. R. - Personal communication.
Link, T. A. - Personal communication.

Prepared by: G.G.L. Henderson, California Standard Company, Calgary, July 1954.

COLONY SAND: Manville formation (Blairmore), Lower Cretaceous

Author: Wickenden, R.T.D., 1948, The Lower Cretaceous of the Lloydminster Oil and Gas Area, Alberta and Saskatchewan, Geol. Surv. Canada, Paper 48-21.

Locality: Restricted to the subsurface in the Lloydminster area (gas sand in Colony No. 1, Lsd. 14, Sec. 25, Twp. 49, Rge. 28 W3)

Lithologic Characteristics: A fairly coarse-grained, clean, friable sand which is glauconitic in its upper part and argillaceous in its lower.

Thickness and Distribution: The sand is present in many wells in the Lloydminster area and attains a maximum thickness of about 15 feet.

Relation to other Units: The Colony sand is at the top of the Manville formation.

Prepared by: W. E. Bannister, The California Standard Company, Calgary, July 1954.

COLORADO GROUP: Upper and Lower Cretaceous

Author: Hayden, F. V., 1876, U.S. Geol. & Geog. Surv. Terr. 8th Annual Report.

Locality: Exposures at east base of Rocky Mountain Front Range, Colorado. No detailed type locality designated. Name immediately applied to other areas included in Map No. 1 of the atlas published by Clarence King of the U.S. Geol. Exploration of the 40th Parallel, 1876.

History: The closely co-ordinated work of Hayden and King (1876, 1878) resulted in the initial adoption of the term Colorado Group to include the Fort Benton, Niobrara, Fort Pierre formations of the Upper Cretaceous. The paleontological work by Meek (1876) and a re-study of the formational grouping by White (1878) resulted in restriction of the term to include only the Fort Benton and Niobrara formations.

As clear correlatives to the Benton and Niobrara were not recognized in Alberta the term Colorado with formational status was generally adopted and remained in use for many years by geologists in western Canada. It is understood to apply to strata occurring above the Blairmore (Mannville) formation and underlying the Lea Park Shale. This use contrasts with Hume's single term, Alberta shale, which includes the Colorado and the overlying Lea Park or its equivalent. Nauss (1947) introduced a new name, Lloydminster shale, to include all strata generally understood to be within the Colorado formation or group. The term, Lloydminster, has not been generally adopted. Badgley (1952) proposed the raising of the formation to group status and described several of its components of Lower Cretaceous age. This term, Colorado Group is now generally accepted.

Lithologic Characteristics: Dark grey marine shale constitutes by far the largest lithologic rock type in the Colorado Group. Due to its thickness and wide distribution, many other lithologic types are present. These include prominent sandstones, chert pebble conglomerate, bentonite, thick sections of marine grey shale and abundant calcareous white specks of organic origin, red speckled shale, thin limestone bands, ironstone concretions and at least one sandy zone, showing evidence of an important break in deposition (Fish Scale Zone). The normal sands of the Colorado are thin-bedded shaly marine sands composed of quartz and chert. They tend to be well sorted blanket sands of submarine origin with locally variable shale content.

Thickness and Distribution: The Colorado Group occurs throughout central and southern Alberta, excepting where it has been removed by erosion, primarily in the far northeastern part of Alberta. Correlatives of the Colorado Group are present to the northwest and east of these Alberta localities. The thickness of the Colorado group is greatest in western Alberta where it exceeds 3000 feet and least in eastern-central Alberta where it thins to 600 feet.

Relation to Other Units: Overlain in type locality by Fox Hills Group and underlain by Dakota Group. In Alberta this formation is underlain by the Blairmore (Mannville) formation and overlain by the Lea Park shale. It correlates with all but the Lea Park equivalent of Hume's Alberta shale. Local formations or members of the Colorado group are the Joli Fou shale, Viking (Bow Island, Pelican) sandstone, Blackleaf, Medicine Hat gas sand, Basal Colorado (Cessford) sandstone, Fish Scale sandstone, Cardium (Bighorn) sandstone, Blackstone shale, Wapiabi shale, Crowsnest Volcanics, Jumpingpound sandstone and First and Second White Specks zones.

The Colorado correlates with the Ashville, Favell and Vermilion River formations of Manitoba and with the Peace River, Shaftesbury, Dunvegan and Smoky River Group, below the "First specks" of the Peace River country.

References:

Hayden, F. V., 1876, Resume of the Geology along the Eastern Base of the Front or Colorado

Range; Silurian Carboniferous, Triassic, Jurassic, and Cretaceous Groups, U.S. Geol. and Geog. Surv. Terr. 8th Annual Report.

King, C., 1876, U.S. Geol. Exploration of the 40th Parr. Atlas Map No. 1.

King, C., 1878, U.S. Geol. Exploration of the 40th Parr. Vol. 1.

Meek, F. B., 1876, A report on the Invertebrate Cretaceous and Tertiary fossils of Upper Missouri "Country", U.S. Geol. Surv. Terr. Vol. 9.

White, C.A., 1878, Report on the Geology of a Portion of Northwestern Colorado, U.S. Geol. and Geog. Surv. Terr. 10th Ann. Rept. pp. 21, 22, 30.

Hume, G.S., 1929, The Highwood-Jumpingpound Anticline, With Notes on Turner Valley, New Black Diamond, and Priddis Valley Structures, Alberta, Geol. Surv. of Canada, Summary Report, 1929, Part B.

Webb, J. B. and Hertlein, L.G., 1934, Zones in the Alberta Shale in the Foothills of Southern Alberta, A.A.P.G. Vol. 18, Part 2.

Nauss, Arthur W., 1947, Cretaceous Microfossils of the Vermilion Area, Alberta, Journal of Paleontology, Vol. 21, No. 4.

Badgley, Peter C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geol. Survey of Canada Paper 52-11.

Prepared by: C. Warren Hunt, Canadian Homestead Oils Ltd., Calgary, May 26, 1954.

COMMOTION FORMATION: St. John Group, Lower Cretaceous

Author: R.T.D. Wickenden and G. Shaw, 1943, Stratigraphy and Structure in Mount Hulcross-Commotion Creek Map Area, British Columbia, Canada Department of Mines and Resources, Mines and Geology Branch, Geological Survey Paper 43-13.

Locality: Hasler Creek, Township 76, 2 miles west of Range 26, or 2½ miles southwest from southwest corner of Peace River Block. May be reached by Hart Highway. Locality is about 70 miles west of town of Dawson Creek on this highway.

Lithologic Characteristics: Interbedded sandstone, chert pebble conglomerate, and shale; a little coal.

Thickness and Distribution: At least 1300' to 1500'. Lowest beds which are sandstones on Hasler Creek are 500' to 600' thick. About 250' of dark grey shale overlies these sandstones followed by an upper sandstone about 200' thick. Conglomerate overlies the upper sandstone. This conglomerate is about 100' thick and in places is separated into two separate beds (Goodrich Creek, south side of Pine River). On Commotion Creek about 180' of sandstone, shale, and coal overlies the conglomerate. Only mapped in the area immediately west of Commotion Creek in the Pine River Valley and vicinity.

Relation to other Units: Rests on shale of Moosebar formation and overlain by shale of the Hasler formation.

References:

Spieker, Edmund M., 1921, The Geology and Oil Resources of the Foothills South of Peace River in North Eastern British Columbia; in Report of Oil Survey in the Peace River District, 1920, by John A. Dresser and Edmund M. Spieker, Department of Lands, Province of British Columbia.

Williams, M. Y., 1940, Pine River No. 1 well, Peace River British Columbia, Report for the month of September, 1940, Department of Mines, British Columbia, Unpublished manuscript.

Stelck, C. R., 1941, Geological Investigations, Peace River District, British Columbia, Minister of Mines, unpublished manuscript.

Mathews, W. H., 1947, Geology and Coal Resources of the Carbon Creek-Mount Bickford Map Area, 1946, British Columbia, Department of Mines, Bulletin No. 24.

McLearn, F. H., and Kindle, E. D., 1950, Geology of Northeastern British Columbia, Geol. Sur. Can., Memoir 259, pp. 77-78.

Prepared by: C. E. Cleveland, Pacific Petroleums Limited, Calgary, July 1954.

CONRAD MEMBER: Sawtooth formation, Ellis Group, Middle Jurassic (Bathonian)

Author: Weir, J. D., 1949, Marine Jurassic Formations of Alberta Plains, 1949, Bull. Amer. Assoc. Petrol. Geol., Volume 33, No. 4.

Locality: Conrad oil field, where the Conrad member is the producing horizon.

Lithologic Characteristics: In Conrad and Sweetgrass Hills areas is clean fine-grained quartz sandstone. Silt content increases to the west until member becomes fine-grained quartz siltstone. At type area the sand is fine to medium grained and well sorted with excellent porosity.

Relation to other Units: Overlain conformably by the Belemnite conglomerate, and conformably underlain by medial shale member of the Sawtooth.

Prepared by: L. L. Bell, Stanolind Oil & Gas Co., Calgary, June, 1954.

COOKING LAKE MEMBER: Upper Devonian

Author: Geological Staff, Imperial Oil Ltd., 1950, Devonian Nomenclature in Edmonton Area, Alberta, Canada, A.A.P.G. Vol. 34, pp. 1807-1825.

Type Well: Calmont Leduc #3, Led. 4, Sec. 14, Twp. 51, Rge. 21, W4 M.

Lithology: Mainly buff fragmental fossiliferous limestone with beds or zones of granular, oolitic and finely crystalline limestone. The upper part is interbedded with black calcareous Duvernay type shale. Fossils include plant spores, ostracods, crinoids, brachiopods and stromatoporoids. The Cooking Lake is a partly reworked biostrome deposited under stable shallow water conditions.

Thickness: 150' - 350'

Distribution: Covers approximately the same area as the Duvernay member. It is difficult to recognize in the Jefferson country of Southern Alberta and Saskatchewan and is replaced by a black shale facies west of the Edmonton reef trend.

Relation to other Units: The member occupies a position conformably between the underlying Beaverhill Lake formation and the overlying Duvernay member.

References:

Belyea, Helen R., Notes on the Devonian System of the North Central Plains of Alberta, G.S.C. Paper 52-27.

Prepared by: Gunnar Haugrud, Royalite Oil Company, Ltd., Edmonton, Alberta, July 1954.

CORRAL CREEK FORMATION: Upper Precambrian of the Bow Valley near Lake Louise, Banff National Park, Alberta.

Author: Walcott, C.D. (1910), Precambrian Rocks of the Bow River Valley, Alberta, Canada, Smithsonian Misc. Coll., Vol. 53, No. 7, p. 427.

Type Locality: Corral Creek, northeast of Lake Louise, and eighteen miles west of Banff on the Banff-Lake Louise highway.

Lithologic Characteristics: Light grey coarse-grained hard quartzitic sandstones with a few thick layers of fine quartz conglomerate. The hard quartzitic sandstones usually break up on exposure to the weather. The quartz grains are milky white, or glassy and stained.

Thickness: Walcott estimated a thickness greater than 1,320 feet in the hills adjoining Corral Creek.

Relation to Other Units: Base is not exposed, overlain conformably by the Hector formation. Walcott suggested correlation with the Kintla and Sheppard formation of the Waterton Lakes district, but more recent work has shown this to be unlikely and Walker (1926, p. 19) and others have better evidence for correlation with the younger Horsethief Creek formation of the Windermere district.

References:

Fox, F.G. (1953), Glossary of Formation Names of Southwestern Alberta, Alberta Society of Petroleum Geologists, 3rd Annual Field Conference and Symposium, Guide Book, pp. 184-185.

Walcott, C.D. (1928), Pre-Devonian Paleozoic Formations of the Cordilleran Provinces of Canada, Smithsonian Misc. Coll., Vol. 75, p. 257.

Walker, J.F. (1926), Geology and Mineral Deposit of Windermere Map-area, British Columbia, Geol. Surv. Canada, Mem. 148, pp. 17-19.

Prepared by: E. Atkinson, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

COSTIGAN MEMBER: Palliser Formation, Upper Devonian

Author: de Wit, R., and McLaren, D. J., 1950, Devonian Sections in the Rocky Mountains between Crowsnest Pass and Jasper, Alberta, Geological Survey of Canada, Paper 50-23.

Type Locality: Mt. Costigan, east boundary of Banff National Park (Twp. 27, Rge. 10 W5 M).

Lithology: Consists of a cyclic nodular sequence of thinly bedded dark grey limestones and dolomites. Occasional beds are quite silty, laminated, and contain fragments and nodules of black chert. The upper portion contains a Cyrtospirifer fauna which generally occurs in the upper 25 feet of the member.

Thickness: 90' - 350'.

Distribution: Eastern Rocky Mountains.

Relation to other Units: Rests conformably on the Morro member of the Palliser formation and is overlain disconformably by the Exshaw formation.

Remarks: The Costigan member resulted from a resumption of shallow water conditions which continued to the end of Palliser time.

References:

McLaren, D. J., 1953, Summary of the Devonian Stratigraphy of the Alberta Rocky Mountains, A.S.P.G. Field Conference Guide Book, pp. 89-104.

Fox, F. G., 1951, Devonian Stratigraphy of the Rocky Mountains and Foothills between Crowsnest Pass and the Athabaska River, Alberta, Canada, Bulletin A.A.P.G., Volume 35, pp. 822-843.

Prepared by: Bob Stevenson, Royalite Oil Co., Ltd., Calgary, July 1954.

CROOKED HOLE SAND: Lower Blairmore formation, Lower Cretaceous, southern Alberta foothills.

Locality: No type section has been designated. The sand is present at 8800 - 8810' in the samples of the Home Millarville #20 well in Lsd. 7, Sec. 24, Twp. 21, Rge. 4 W5 and at 8645 - 8655' in the Shell Anglo-Canadian Pine Creek #1 well in Lsd. 12, Sec. 12, Twp. 20, Rge. 2 W5. The samples are on file with The Petroleum and Natural Gas Conservation Board at Calgary.

History: This sand was named during the drilling of the Turner Valley field. Drillers, particularly with cable tools, had difficulty keeping the hole straight through this horizon.

Lithologic Characteristics: Buff, very fine grained quartz sand with calcareous matrix. Often has fine calcite veinlets and scattered pin-points of glauconite.

Thickness and Distribution: Approximately 10 ft. thick and extending throughout the southern Alberta foothills belt.

Relation to other Units: Underlies the Home sand by about 50 feet and is at the top of a limey series within the marine phase of the lower Blairmore. It overlies the Metacypris ostracod zone and may be equivalent to the Glauconitic sand.

References:

Petroleum and Natural Gas Conservation Board of Alberta, 1945, Type well log of Turner Valley and vicinity (ozalid print).

Petroleum and Natural Gas Conservation Board of Alberta, 1949, Abbreviations for Geological terms, Schedule of wells drilled for oil and gas to 1949.

Prepared by: J. T. Humphreys, Calgary, July 1954.

CROW INDIAN LAKE MEMBER: Basal member of Sawtooth formation, Ellis group, Middle Jurassic (Bathonian).

Author: Furnival, G. M., (See Weir, J. D., 1949, Marine Jurassic Formations of Alberta Plains, Bull. Amer. Assoc. Petrol. Geol., Volume 33, No. 4, p. 552).

Locality: Dominion Oil Company Crow Indian Lake Province No. 1 Well, Lsd. 6, Sec. 27, Twp. 4, Rge. 13 W4.

Lithologic Characteristics: Quartzose pale grey or greenish grey shaly fine grained sandstone.

Thickness and Distribution: 15-20 feet. Recognizable in immediate area of type section, but merges with sand above to the north and disappears southward and westward.

Relation to other Units: Overlain conformably by the medial shale member (unnamed) of the Sawtooth; overlies truncated Paleozoic sediments (Mississippian) unconformably.

Prepared by: L. L. Bell, Stanolind Oil & Gas Co., Calgary, June 1954.

DEVILLE FORMATION: Bullhead (?) group, Lower Cretaceous and Jurassic

Author: Badgley, C. Peter, 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geological Survey of Canada, paper 52-11, p. 7.

Locality: Imperial Deville No. 1 Well, Lsd. 9, Sec. 36, Twp. 51, Rge. 20 W4, Alberta, depths 3555.5-3605.

Lithologic Characteristics: Comprised of rocks of the following types in order of decreasing abundance: greenish grey waxy shales, greenish grey silty shales, greenish grey shaly siltstones, greyish green argillaceous quartzose sandstones, and dark reddish brown shales and silty shales. Siderite nodules are commonly embedded in the shales. In many wells, the Deville-McMurray contact is gradational and difficult to place, whereas in other wells it appears to be disconformable. The Deville type shales and sandstones are, however, distinct from those of the McMurray formation. The character of the lower contact also varies, being transitional in some wells and abrupt in others.

Relation to other Units: The formation is underlain by Devonian rocks, in the type locality, and overlain by the McMurray formation. " . . . . was previously known as the 'Detrital Zone'."

Prepared by: J. S. Crewson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

DUNVEGAN FORMATION: Upper Cretaceous

Author: Dawson, G. M. (1880) G. S. Canada Progress Report.

Locality: Near Dunvegan Trading Post, Peace River, Northwestern Alberta.

Lithologic Characteristics: Consists of marine and non-marine sandstone, light grey to yellowish buff in colour. Beds are massive and show cross-bedding. Zones of thin bedded sandstone and shale, shelly limestone and coal are present. Fresh water and marine fossils occur in the sands. The Dunvegan forms conspicuous light brown weathering mesa's and buttes.

Thickness and Distribution: 500' to 600' in the Peace River area thinning to the south and east. The Dunvegan extends from the Peace River area north to Fort Nelson and the Liard River, and in the foothills belt as far south as Jasper.

Relation to other Units: The Dunvegan is overlain conformably by the Blackstone formation in Central Alberta and by the Smoky River group in the Smoky River area and adjoining areas of northeastern British Columbia. It is underlain by the Shaftesbury formation of the Fort St. John group. Both contacts are gradational. The Dunvegan is correlated with the Ft. Nelson formation of Northeastern British Columbia and Liard River.

Palaeontology: Non-marine fossils: Unio dawlingi; Melania; Unio sulfuriensis; Corbula pyriformis var. dunveganensis. Marine Fossils: Corbula cf. nematophora; Inoceramus dunveganensis; Inoceramus var. mcconnelli; Inoceramus rutherfordi; Inoceramus athabaskensis; Inoceramus cf. allani; Barbatia micronema; Ostrea anomioides; Dunveganoceras poucecoupense.

References:

McLearn, F. H. (1945), The Upper Cretaceous Dunvegan Formation of Northwestern Alberta and Northeastern British Columbia, Report and 6 Fossil Plates, Geol. Surv. Canada Paper 45-27.

Crickmay, C. H. (1944), Pouce Coupe - Peace River Alberta and British Columbia, Preliminary Map, Geol. Surv. Canada, Paper 44-31.

Irish, E.J.W. (1951), Pierre Grey Lakes Map Area, Geol. Surv. Canada, Mem. 258 (Diagram showing relationship of Fort St. John Group, Dunvegan, Blackstone & Bighorn p. 24)

Lang, A. H. (1947), Moberly Creek Map Area Alberta, (Report & Map), Geol. Survey Canada, Paper 47-11.

Lang, A. H. (1947), Brule and Entrance Map Area Alberta, p. 12, p. 27, Geol. Surv. Canada, Mem. 244, (A thin sandstone bed is indicated by Lang but not definitely assigned to the Dunvegan Sandstone).

Gleddie, J. (1949), Upper Cretaceous in Western Peace River Plains Alberta, Bull. A.A.P.G., Vol. 33, No. 4, pp. 511-532, 9 figs.

Prepared by: Gulf Oil Company, Calgary, June 1954.

DUVERNAY MEMBER: Upper Devonian

Author: The name was first applied by unknown well site geologists to describe the brown bituminous shales found in wells drilled in the Duvernay area, and later defined by the Geological Staff of Imperial Oil, 1950 Devonian Nomenclature in the Edmonton Area, A.A.P.G., Vol. 34, pp. 1807-25.

Type Well: Anglo Canadian Beaverhill Lake #2, Lsd. 11, Sec. 11, Twp. 50, Rge. 17 W4 M.

Lithology: Consists of a series of dark brown bituminous shales, dark brown, black, and grey-green calcareous shales, and dense argillaceous limestones. Fossils include ostracods, crinoids, brachiopod spines, conodonts, and fish scales. The Duvernay is an off-reef facies deposited under shallow water conditions.

Thickness: 0 - 300'

Distribution: Recognized as a lithologic unit north of the Big Valley area between the Pembina River and the Wainwright - St. Paul area. It is indistinguishable from the lower Ireton and Cooking Lake in the area north and west of the Pembina River or from the lower Jefferson south of the Big Valley area and into Saskatchewan. It is eroded off northeast of Duvernay.

Relation to other Units: The member occupies a position conformably between the underlying Cooking Lake member and the overlying Ireton member. It is missing in areas of Leduc reef growth.

References:

Belyea, Helen R., Notes on the Devonian System of the North Central Plains of Alberta, G.S.C. Paper 52-27.

Prepared by: Gunnar Haugrud, Royalite Oil Company, Ltd., Edmonton, July 1954.

DYSON CREEK MEMBER: Rundle Formation, Mississippian

Author: Beach, H. H., 1947, Mississippian and Later Paleozoic Stratigraphy of the Rocky Mountain Front Range. Unpublished paper presented before the Alberta Society of Petroleum Geologists.

History: Beach (1947) named the Dyson Creek member as the lowest of his three divisions of the Rundle formation. The first published reference to the term seems to be by Clark (1949, p. 629) relative to his "Lower Rundle" in Bow River Valley.

Locality: The type area was given by Beach (personal communication) as at Sheep Mountain in the Dyson Creek Map-area, 50 miles south-southeast of the Bow River Area, and the type section the lower portion of the Rundle described by Hage (1943, p. 4).

Lithologic Characteristics: "Largely light gray, coarse-to fine-grained crinoidal limestone containing chert inclusions. The beds of crinoidal limestone are massive and form prominent light gray cliffs" (Hage, 1943, p. 4).

Thickness and Distribution: 970 feet at type locality. Away from type area the application of the term "Dyson Creek" is not exactly the same as at the type, so that thicknesses are misleading.

Relation to other Units: By definition the Dyson Creek rests on the Banff formation and is succeeded by the Shunda member of the Rundle. As to the latter relationship, however, there is some inconsistency, since, strictly interpreted, the type Shunda of the Carrot Creek area does not make contact with the Dyson Creek of Sheep Mountain, there being some 200 to 300 feet of intervening strata equivalent to the lower portion of the Mount Head formation. Hage's (1943) lower Rundle (equals the Dyson Creek) member at Sheep Mountain appears to be equivalent to Douglas' (1953) Livingstone formation. On the other hand, the "Dyson Creek" of the Turner Valley field (Gallup, 1951) represents only a part of the Dyson Creek of the type area on Sheep Mountain, namely that portion for which Douglas proposed the name Pekisko member of his Livingstone formation. This restricted portion of the Dyson Creek probably is what is being called "Dyson Creek" in much of the foothills and plains subsurface. Clark's (1949, p. 628) figure of 1590 feet thickness of the Dyson Creek at Tunnel Mountain indicates that probably he included all of Douglas' Livingstone and the lower 200 to 300 feet of the succeeding Mount Head formation.

References:

Clark, L. M., 1949, Geology of the Rocky Mountain Front Ranges near Bow River, Alberta, Amer. Asso. Petrol. Geol. Bull., Vol. 33, No. 4, pp. 628-9.

Gallup, W. B., 1951, Geology of Turner Valley Oil and Gas Field, Alberta, Canada, Amer. Asso. Petrol. Geol. Bull., Vol. 35, No. 4, p. 809.

Douglas, R.J.W., 1953, Carboniferous Stratigraphy in the Southern Foothills of Alberta, Alberta Soc. Petrol. Geol. 3rd Ann. Field Trip and Symposium, p. 68.

Fox, F. G., 1953, Glossary of Formation Names of Southwestern Alberta, idem, p. 197.

Hage, C. O., 1943, Dyson Creek Map Area, Alberta, Canada Geol. Survey Paper 43-5, p. 4 (describes section later designated the "Dyson Creek type" by Beach).

Prepared by: D. G. Penner, Royalite Oil Co., and Gilbert O. Raasch, Canadian Stratigraphic Service, Ltd., Calgary, July 1954.

EASTEND FORMATION: Upper Cretaceous

Author: Russel, L. S., (1933B), The Cretaceous-Tertiary Transition of Alberta, Roy. Soc. Canada Trans, Ser. 3, Vol. 26, Sec. 4, pp. 121-156.

Locality: In the valley of the Frenchman river near Eastend, Twp. 6, Rge. 21, W3M., Southwest Saskatchewan.

History: Formerly called Division "Y" of Foothills by Dawson (1875) and tentatively, the sands "A" or "D" by McLearn (1929)

Lithologic Characteristics: The Eastend is essentially a sandy, silty sequence. In the type area near Eastend the formation consists of about 70 feet of silt and fine sand. The Alberta development is much less uniform and consists, in the Willow Creek section near Thelma, of about 130 feet of massive sandstone at the base, overlain by about 100 feet of shales and sandstone. Next in the sequence is a further massive sandstone, followed by alternating sands and clays and carbonaceous beds, and finally about 30 feet of silts. It should be noted that Furnival (1946) includes the 130 feet of basal sandstone and 100 feet of shale overlying it, in the Bearpaw formation.

Thickness and Distribution: The Eastend formation outcrops in the Wood Mountain and Pinto Butte areas of Southern Saskatchewan and in the Cypress Hills area of Saskatchewan and Alberta. A thickness of about 70 feet is generally agreed upon for the type locality near Eastend. Estimates of the thickness of the section near Thelma, Alberta, vary considerably. Some of the estimates are: McConnel (1885) 250 feet, Williams and Dyer (1930) 655 feet, Russel (1933B) 383 feet and Furnival (1946) (see above) 116 feet.

Relation to other Units: The Eastend formation is overlain by the Whitemud formation and underlain by Bearpaw shale. Upwards the sands become coarser and transitional into the non-marine Whitemud formation with its fossil roots, coarse plant remains and coaly and carbonaceous beds. Downwards, the silt and sand layers become thinner and further apart until only shale remains. So the contact with the Bearpaw shale is gradational and conformable. The Eastend formation records conditions transitional from the marine Bearpaw to the non-marine Whitemud formation. Russel (1932) and also Furnival (1946) consider that the Eastend of Saskatchewan is correlative with only the upper sandy and coal bearing part of the Alberta outcrops. Russel believes the Eastend formation corresponds to the upper part of the Edmonton formation. The upper Eastend beds, including the carbonaceous member and the upper sandstone are probably of Fox Hills age.

Palaeontology: The Eastend fauna is apparently very limited and includes no definitely established short range forms. Protocardia and Dentalium have been collected, and Fraser et al (1935) reported poorly preserved marine fossils. Russel and Landes (1940) discuss a fauna from the lower part of the Eastend, but Furnival considers this interval to be a part of the Bearpaw formation.

References:

Dawson, G. M. (1875) Geol. & Res. of the Region in the Vicinity of the 49th parallel-Brit. N. America Boundary Commission.
McLearn, F. H. (1929) S. Sask. Geol. Surv. Canada Sum. Rept. 1928, Part B, pp. 30-44.
McLearn, F. H. (1930) Stratigraphy, Clay and Coal deposits of S. Sask. Geol. Surv. Canada, Sum. Rept. 1929, Part B. pp. 48-63.
Furnival, G. M. (1946) Cypress Lake Map Area, Sask. G.S. Memoir 242.
McConnel (1885) Ann. Rept. N.S. Vol. 1, Pt. C, p. 25.
Williams and Dyer (1930) G. S. Mem. 163, p. 41.
P. J. Fraser, F. H. McLearn, L. S. Russel, P. S. Warren, R.T.D. Wickenden (1935) Geol. of S. Sask. G. S. Memoir 176.
L. S. Russel and R. W. Landes (1940) Geol. of S. Alberta Plains, G.S. Memoir 221

Prepared by: Gulf Oil Company, Calgary, June 1954.

EDMONTON FORMATION: Upper Cretaceous

Author: Allan, J. A. and Sanderson, J.O.G., 1945, Geology of Red Deer and Rosebud sheets, Alberta, Research Council of Alberta, Report No. 13.

Locality: Edmonton area, in North Saskatchewan River Valley.

Lithologic Characteristics: Vertical and lateral lithologic variations are notable in the Edmonton formation. It consists predominantly of fresh to brackish water, fine-grained sandstone, calcareous sandstones, sandy shales, bentonitic sandstones and shales, bentonite, iron stone nodules and bands, carbonaceous shales, and coal. Bentonite is conspicuous throughout the series of beds, with shales and sandstones containing appreciable quantities. Pure bentonitic beds are locally present. Hard, flaggy sandstones occur in well-defined horizons. These cap the mesas, buttes, and plateaus found where badland topography is developed. In east-central Alberta a tuff horizon referred to as the Kneehills tuff occurs within the Edmonton formation. This bed forms a reliable stratigraphic marker over considerable distances and is tentatively recognized as far south as the Oldman River (Tozer, 1952). (The Edmonton formation is remarkably free of coarse clastic material.)

Thickness and Distribution: In the plains (the Edmonton formation is 1,000 to 1,200 feet thic in the foothills thicknesses up to 2,500 feet have been reported) (Allan and Sanderson, 1945). "As originally deposited, the Edmonton formation covered most of Alberta east of the foothill and south of latitude 56°. It grades into the thinner Fox Hills formation to the east and south, and on the west becomes a part of the thick, undifferentiated deposits of the Upper Montana subdivision of the Cretaceous. Similar formations that are stratigraphically equivalent in the Western States are known as the Horsethief sandstone in Montana, and Lennup and Mutestse in Wyoming".

Relation to other Units: It is overlain disconformably by the Paskapoo Formation. The basa contact of the Edmonton formation is easily recognized where it is underlain by the marine Bearpaw formation, more difficultly so where it is underlain by the Belly River formation. The Edmonton formation is correlated with the Blood Reserve and the St. Mary River formation of the southern plains. The lower part of the Willow Creek formation is possibly correlative with the Edmonton formation. The Edmonton is also correlated with the Eastend, Whitemud, Battle, and Frenchman formations of the Cypress Hills; and the Fox Hills, and the Lance formations of Montana. The upper part of the Pierre formation may be equivalent to the lower par of the Edmonton formation. In the foothills of the mountains Edmonton equivalents are represented by the upper part of the Wapiti and Brazeau groups.

Palaeontology: The Edmonton formation contains an extensive vertebrate fauna, especially in the upper part, of which Triceratops is the most widely known. Fresh water and terrestrial invertebrates occur throughout. Molluscs comprise the most important faunal element, with Ostrea and Unio being common and well known. A few bryozoans have been collected by Sanders (1945).

Comments: The Edmonton formation (forms spectacular badlands along the Red Deer River) conta extensive coal deposits in central Alberta, and has been mined for bentonite used in the preparation of drilling muds. It has furnished a favourite hunting ground for collectors of vertebrate remains in the Drumheller region.

References:

Sternberg, C. M., 1947, The Upper Part of the Edmonton Formation of Red Deer Valley, Alberta Can. G. Dept. of Mines and Resources, Geol. Surv. Paper 47-1.

Tozer, E. T., 1952, The St. Mary River-Willow Creek Contact on Oldman River, Alberta, Can. Dept. of Mines and Res. Geol. Surv., Paper 52-3.

Williams, M. Y., 1930, and Dyer, W. S., Geol. of Southern Alberta and Southwestern Sask. Can Dept. of Mines, Geol. Surv., Mem. 163.

Prepared by: Gulf Oil Company, Calgary, June 1954.

ELK POINT FORMATION: Probable Middle Devonian

Author: McGehee, J. R., 1949, Pre-Waterways Paleozoic Stratigraphy of the Alberta Plains, A.A.P.G. Volume 33, Number 4, pp. 603-613.

Locality: Vicinity of Elk Point town in N.E. Alberta (Twp. 57, Rge. 7, W4). Findings were based on sample cuttings and cores from deep wells.

Lithology: Evaporitic in general. The top is marked by red and green dolomitic shales. Contains anhydritic dolomites, slightly fossiliferous argillaceous silty limestones, and up to 1100 feet of salt in three major beds.

Thickness and Distribution: From 1850 feet in Lotsberg well (Twp. 61, Rge. 8, W4) it thins in all directions. Toward the northwest it maintains thicknesses of 1200' to 1500' into the Northwest Territories. To the west and southwest it thins to about 150' thick. To the east it thins to about 500' in the Manitoba outcrop section. The formation is present over most of the sedimentary area of Western Canada except in Southeast Alberta and over the Peace River Arch (Twp. 84, Rge. 21, W5).

Relation to other Units: Elk Point formation conformably underlies the Beaverhill Lake formations of Upper Devonian age and is unconformably underlain by Silurian dolomite, Ordovician fossiliferous limestones, Cambrian glauconitic sands or Pre-cambrian crystalline rocks. Considered correlative with the Ghost River formation of the Rocky Mountains.

References:

Baillie, A. D., 1953, Devonian System of the Williston Basin Area, Mines Branch of Manitoba Publication 52-5. Geological notes provide an abstract of the above publication in A.A.P.G. February 1953, Volume 37, Number 2, p. 444.

Geological Staff Imperial Oil, September 1950, Devonian Nomenclature in Edmonton Area, Alberta, A.A.P.G. Volume 34, Number 9, p. 1807.

McCourt, J. B., November 1953, Recent Developments in the Leduc Woodbend Field, A.S.P.G. Bulletin Volume 1, Number 11, p. 4.

Webb, J. B., November 1951, Geological History of Western Canada Plains, A.A.P.G. Volume 35, Number 11, p. 2298.

Remarks: Sketchy fossil evidence and a westward projection of Baillie's "Elk Point Group" indicates that the top 650' of the "Elk Point Formation" could be Middle Devonian. Thus the top salt and some evaporites lying above the probable Ashern equivalent (Elk Point #11 Well) would appear to constitute the equivalent of the "Elk Point Group". The balance of the section in the type area is then perhaps Silurian. This still leaves the problem of reconciling "Formation" and "Group" ranks.

Prepared by: A. H. Ellison, Royalite Oil Co., Ltd., Calgary, July 1954.

ELLERSLIE MEMBER: Manville Group, Lower Cretaceous

Author: C. Warren Hunt (1950), Prel. Rept. on Whitemud Oil Field, Alta., Canada, Bull. A.A.P.G., Vol. 34, No. 9.

Locality: Whitemud Area (7 miles south of Edmonton) Imperial Whitemud No. 3 well, Sec. 15, Twp. 51, Rge. 25 W4th.

History: The name was proposed for the locally termed "Quartz Sand Series" at the base of the lower Cretaceous in the Edmonton-Leduc district.

Lithologic Characteristics: Hunt states: "The Ellerslie sediments in the Whitemud area are divisible into two zones, an upper and lower. The upper Ellerslie is 121 feet thick (in the type well) and consists of sand interlensed with thinly, cross-bedded grey, sandy shales and shaly sands. The sands are fine to very fine grained, firm to friable, and fossiliferous..... The lower zone of the Ellerslie is 89 feet thick and consists of angular and medium grained quartz sand, carbonaceous silty shales, varved quartz silts and silty shales, and traces of coal".

Thickness and Distribution: The Ellerslie member is 210 feet thick in Imperial's Whitemud No. 3 well. Hunt states that there is a general thinning in most directions away from the Whitemud area. Badgley (1952) prepared an isopach map of the McMurray formation which indicates that the thickness of the McMurray formation in the Whitemud area agrees with Hunt's thickness for the Ellerslie. However, the McMurray formation thickens away from the Whitemud area, except to the southwest. The Whitemud field lies between two N-S trending troughs in which the McMurray formation attains a thickness of over 300 feet. Hunt (1950) states that the Ellerslie member is identifiable within a radius of 15 miles of the Whitemud area, about 7 miles south of Edmonton. The McMurray formation, of which the Ellerslie would appear to be a local lithologic phase, is recognized over a large area of Central Alberta.

Relation to other Units: According to Hunt, "The top of the Ellerslie is determined by the first occurrence of pure vitreous quartz sand or silt below the 'ostracod zone'. The ostracod zone is a calcareous, fossiliferous, black, brackish water shale approximately 45 feet thick." The Ellerslie has been deposited on a Palaeozoic erosion surface, and overlies post Palaeozoic deltaic and detrital deposits. The angular, pure quartz sand of the Ellerslie, with its typical vitreous appearance grades downward into salt and pepper sands, and silty and sandy shales and clays. These underlying deposits are characterized by rounded quartz and chert grains. The Ellerslie is referred to as a member of the Blairmore formation by Hunt. It is probably correlative with that part of the McMurray formation below the Ostracod zone and also partly with the Dina sandstone of the Manville Group.

Comments: According to Hunt, "In wells drilled to date the first production occurs 30-50 feet below the top of the Ellerslie 'quartz sand series'. When well developed the producing sand is fine to very fine grained, well sorted, angular or subangular, 100% quartz, has average porosity of 25.5%, permeability in excess of 3,000 millidarcys, and occurs normally in beds of 1-5 feet".

References:

Peter C. Badgley (1952) Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alta., G.S.C. Paper 52-11.

Prepared by: Canadian Gulf Oil Co., Calgary, July 1954.

ELLIS GROUP: Middle and Upper Jurassic, Montana (widespread), Wyoming, Southern Saskatchewan and Southern Alberta.

Author: Peale, A. C., 1893, U.S.G.S. Bull. 110, map. This map of the "vicinity of Three Forks, Mont." shows the Ellis formation as overlying the Quadrant formation and underlying the Cretaceous "Dakota" formation, but does not describe the deposits.
Iddings, J. P. and Weed, W. H., 1894, U.S.G.S. Livingston Folio, No. 1.
Peale, A. S., 1896, U.S.G.S. Threeforks Folio, No. 24.

Locality: Named from Fort Ellis, an old military post east of Bozeman, Mont., near which the formation is mapped in Livingston quadrangle folio.

Lithologic Characteristics (Alberta): The Ellis group may be divided into three members in Alberta as follows:

3. The Swift formation is composed of a lower dark grey non-calcareous micaceous shale and an upper bedded sandstone member (Ribbon-sandstone). Glauconite and chert pebbles occur at the Swift-Rierdon contact in some places.
2. The Rierdon formation is composed of greenish grey calcareous shales and argillaceous limestones.
1. The Sawtooth formation, itself divided into an upper sandstone, at the top of which usually occurs a widespread shaly conglomerate containing belemnites and chert pebbles; a medial dark green pyritic shale member; and a lower sandstone member. These units interfinger eastward with limestone, shale, and sandstone beds.

Thickness and Distribution:

3. Swift formation: thickness 0-100 feet, extent limited to S.E. and S.W. corners of Alberta and the first five townships of central south Alberta by pre-Blairmore erosion.
2. Rierdon formation: thickness 0-140 feet, extent determined by pre-Blairmore erosion and approximately limited similarly to the Sawtooth.
1. Sawtooth formation: thickness 0-50 feet, extent determined by pre-Blairmore erosion and limited to the north approximately by the Oldman and South Saskatchewan Rivers.

Relation to other Units: The Ellis group is correlative, in the main part, to the Fernie group. The Ellis group lies unconformably on limestone of Mississippian age. Irregularities in the Mississippian palaeotopography influence the distribution and thickness of the group. In Alberta the group is overlain by the continental Blairmore formation of Lower Cretaceous age; the Upper Jurassic Morrison beds having been removed in Alberta by pre-Blairmore erosion.

References:

Lexicon of Geologic names of the United States Geological Survey Bull. No. 896.
Weir, J. D., 1949, Marine Jurassic Formations of Southern Alberta Plains, Amer. Assoc. Petrol. Geol. Bull., Vol. 33, No. 7, pp. 547-563.
Cobban, W. A., 1945, Marine Jurassic Formations of Sweetgrass Arch, Montana, Amer. Assoc. Petrol. Geol. Bull., Vol. 29, No. 9, pp. 1262-1303.
Frebold, Hans, 1953, Correlation of the Jurassic Formations of Canada, Geol. Soc. of Amer. Bull. Oct. 1953, Vol. 64, pp. 1229-1246.

Prepared by: Sun Oil Company, Calgary, July 1954.

FALHER MEMBER: Ft. St. John Group, Lower Cretaceous

Author: Alberta Study Group, 1952, Lower Cretaceous of the Peace River Region, Western Canada Sedimentary Basin, Amer. Assoc. Petrol. Geol., 1954, Tulsa, Okla.

Locality: The Falher member was introduced in subsurface work in the Peace River area.

Lithological Characteristics: Badgley, 1952, states, "This member consists of a variable succession of greywacke, shales and siltstones, with some thin coal beds, and occasional winnowed greywackes. Traces of glauconite are fairly common, but highly glauconitic sandstones are scarce. In most wells the formation consists dominantly of sandstones, mainly of the greywacke type. Small, poorly preserved, carbonized plant remains are common in the shales which also contain scattered marine invertebrate fragments".

Thickness and Distribution: The Falher member is 367 feet thick at Shell Runaway Lake #1, Lsd. 16, Sec. 25, Twp. 86, Rge. 20 W5th, and thickens to over 800 feet to the west. The Falher member is found in the subsurface sections in west-central Alberta.

Relation to other Units: The Falher member is overlain conformably by the Notikewin sandstone member of the Spirit River formation. There is no particularly well defined equivalent of the Falher member outside of the Peace River region.

Fauna: A few scattered marine invertebrates constitute the only recognized fauna of the Falher member.

Comments: This member has been recognized only in subsurface drilling to date.

References: Badgley, P. C. (1952), Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geol. Surv. Canada, Paper 52-11.

Prepared by: Canadian Gulf Oil Company, Calgary, July 1954.

FAIRHOLME FORMATION: Middle and Upper Devonian

Author: Beach, H. H. (1943), Moose Mountain and Morely map areas, Alberta, Memoir 236, Geological Survey of Canada, pp. 10-15.

Locality: Unnamed mountain at the south end of the Fairholme range, immediately north of Bow River between Kananaskis and Exshaw railway stations. The name is taken from the Fairholme range.

History: Beach's Fairholme corresponds approximately to McConnell's Intermediate limestone and exactly to the Minnewanka lower part, of Shimer. De Wit and McLaren (1950) modified the original definition by designating the arenaceous beds at the top of the Fairholme as the Alexo formation.

Lithology: Beach (1943) recognized a lower division made up of black, fine grained, bituminous, fetid dolomite, thin bedded at the base, more massive and coarser grained at the top. Abundant white, calcite-filled stromatoporoids, amphipora and corals stand out by contrast with the dark matrix. A much less fossiliferous upper division is light grey fetid dolomite in beds up to 20', interbedded with thin medium grained, cross-bedded units. McLaren (1953) recognizes five main lithologic units in the Fairholme reef complex. A transition occurs from the Fairholme carbonates to clastics of the Perdrix in the area between the Clearwater and North Ram rivers. In the Sunwapta Pass area it is largely cherty limestones with a considerable clastic content.

Thickness and Distribution: 1420' at the type section including Alexo, 1100' and 1200' at Moose Mountain. The revised Fairholme is 1700' at Sulphur Mountain, 1600' at Mount Coleman and 1200' at Ram Range. It thickens as far west as it is found. Fairholme type facies also occurs on Mount Coleman, Southesk River area and to the east along the Ancient Wall and between Winnifred Pass and Smoky River. Between these areas the clastic type sequence is developed. The Fairholme continues for an unknown distance south of Banff.

Correlation: The Lower Fairholme is approximately equivalent to the Flume and the Upper Fairholme to the Perdrix and Mount Hawk. Severson suggests a Senecan age for the fauna obtained in the Sunwapta Pass area.

Relation to other Units: The Fairholme overlies the dolomitic siltstones etc., of the Ghost River formation, disconformably according to Fox (1951), and is overlain conformably by the arenaceous Alexo.

References: de Wit and McLaren, D. F. (1950), Devonian Sections in the Rocky Mountains, Geol. Survey. Canada, Paper 50-23, pp. 3-4.

Fox, F. G. (1951), Devonian Stratigraphy of Rocky Mountains and Foothills, Alberta, Bull. Amer. Assoc. Pet. Geol., Vol. 35, No. 4, pp. 835-837.

McLaren, D. J. (1953), Summary of Devonian, Alberta Rocky Mountains, Field Conference and Symposium, Alta. Soc. Pet. Geol., pp. 101-102.

Severson, J. L. (1950), Devonian Stratigraphy Sunwapta Pass Area, Alberta, Bull. Amer. Assoc. Pet. Geol., Vol. 34, No. 9, pp. 1839-1843.

Prepared by: R. G. McCrossan, Seaboard Oil Company, Calgary, July 1954.

FERNIE FORMATION: Jurassic

Author: Leach, W. W., Blairmore - Frank Coal Fields, Geological Survey of Canada, Summary Report 1902-1903 p. 169A; Geology of Blairmore Map Area, Alberta, Geological Survey of Canada, Summary Report 1911 p. 193.

Locality: Near Fernie B.C., exact locality not specified.

Lithologic Characteristics: Dark grey, brown and black shale, commonly sandy, in places calcareous and occasionally slightly bituminous. Northward from type locality the formation includes many sand beds, especially in upper part. Widespread thin phosphatic bed near base.

Thickness and Distribution: 0-1600, thickening westward from wedge edge near Calgary to more than 1600 feet in Banff area, and thickening southwestward from wedge edge to about 800 feet in type locality. South of Calgary the Fernie formation merges with the plains formations of the Jurassic.

Relation to other Units: Rests on eastward beveled Triassic and Mississippian strata, and overlain by sandstone and coal of the Kootenay formation (Upper Jurassic and/or Lower Cretaceous).

References:

Spivak, J., 1949, Jurassic Sections in Foothills of Alberta and Northeastern British Columbia, Bull. A.A.P.G., Volume 33, No. 4, pp. 533-546.

Warren, P. S., 1934, The Present Status of the Fernie Shale, Alberta, American Journal of Science, Volume 27, pp. 58-68.

Warren, P. S., 1931, A Lower Jurassic Fauna from Fernie B.C., Trans. Royal Soc. Can. Volume 25.

Beach, H. H., 1943, Moose Mountain Area, Alberta, Geol. Sur. Can. Memoir No. 236.

Prepared by: D. E. Powley, Stanolind Oil and Gas Company, Calgary, June 1954.

FIDDLE ZONE: Lower Upper Devonian

Author: Raymond, P. E. (1930), The Paleozoic Formations in Jasper Park, Alberta, Amer. Jour. Sci., 5th series, Vol. xx, No. 118, pp. 294-295.

Location: Type section, Roche Miette, Jasper National Park, Alberta.

History: This zone was described by Raymond (1930), but subsequent outcrop studies (Fox, 1950) and de Wit and McLaren (1950) have revised the correlation. The Fiddle is now established as a repeated section from the lower member of the Boule formation, which lower member is currently designated as the Mount Hawk formation. The name has consequently fallen into disuse.

References:

Fox, F. G. (1951), Devonian Stratigraphy of Rocky Mountains and Foothills, between Crowsnest Pass and Athabaska River, Alberta, Bull. A.A.P.G., Vol. 35, pp. 822-843.

de Wit, R. and McLaren, D. J. (1950), Devonian Sections on the Rocky Mountains between Crowsnest Pass and Jasper, Alberta, G.S.C. Paper 50-23.

McLaren, D. J. (1953), Summary of the Devonian Stratigraphy of the Alberta Rocky Mountains, A.S.P.G. Field Conference and Symposium.

Prepared by: C. E. Baynham, Seaboard Oil Company, Calgary, July 1954.

FIRST WHITE SPECKLED SHALE ZONE: Colorado Group, Upper Cretaceous

Author: The name has been used by the oil industry for many years as a descriptive term for a widespread marker horizon.

Lithologic Characteristics: Generally the zone consists of marine, bentonitic grey shale containing calcareous white specks. The white specks themselves are flattened lenticles of chalk no more than 0.5mm in diameter consisting of minute saucer-like plates called coccoliths. Goodman (1951) considers the coccoliths are the fossil remains of coccospheres, a ball-shaped, lime-secreting algae; several of which are probably grouped together in each white speck. Rhabdoliths, as well as coccoliths, have been described from the correlative Boyne formation of Manitoba.

Thickness and Distribution: In north Central Alberta the zone is approximately 160 feet thick. To the east, near Lloydminster it tends to be continuous with the underlying second white speck shale zone. North of the Cypress Hills, near the Alberta-Saskatchewan border, the first white speck zone itself is in two parts, 180 feet and 190 feet thick separated by 145 feet of unspeckled shale. The correlative Boyne formation in Manitoba is about 150 feet thick. A thickness of 20 feet has been recorded in the Peace River area. It underlies the entire western plains of Canada and extends well into the foothills of the Rocky Mountains. Eastward, it persists to the Upper Cretaceous outcrop in Manitoba.

Relation to other Units: The zone marks the top of the Colorado group. In the foothills, the zone is included in the upper Alberta formation, in the Paace River area in the Wapiabi formation and in the McMurray-Athabaska area in the upper part of the La Biche formation. In the Lloydminster-Saskatoon area it is referred to the upper part of the Lloydminster formation and in southern Manitoba it is correlated with the Boyne member of the Vermilion River formation. In most of Alberta the zone is overlain by Lea Park shale. In the foothills and Peace River areas it is overlain by the upper part of the Wapiabi formation. In the southern Alberta plains there is a gradational transition upwards from the speckled shale into the sandstone of the Milk River formation. In Manitoba the zone is overlain by the dark grey and black non-calcareous shales of the Pembina member of the Vermilion River formation. The zone is underlain by unspeckled Colorado shale. In the Smoky River area the zone overlies 140 feet of basal Wapiabi shale. In the McMurray-Athabaska area the zone is underlain by the grey and black, marine La Biche shales. Near Lloydminster the zone is practically continuous with the second white speckled shale zone. The zone in Manitoba is underlain by the dark grey, non-calcareous Morden member of the Vermilion formation.

Palaeontology: The ammonoids Baculites and Scaphites and the Pelecypods Ostrea and Inoceramus have been found in the upper white specks and its equivalents. The micro fossils present include Globergerina, Gumbelina, Lenticulina, Gyroidina and Planulina.

References:

Hume, G. S. and Hage, C. O., 1941, The Geol. of East Central Alberta G.S. Memoir 232.
Goodman, A. J., 1951, White Specks in the Colorado Shale, Bull. A.A.P.G. Vol. 35, No. 11.
Wickenden, R.T.D., 1945, Mesozoic Stratigraphy of the Eastern Plains, Man. & Sask. G.S. Mem. 239.
Fraser et al, 1935, Geol. of Southern Sask. G.S. Mem. 176.

Prepared by: Gulf Oil Company, Calgary, June 1954.

FISH SCALE SANDSTONE: Colorado Group, Upper Cretaceous

Author: The name is a descriptive term for a widespread marker horizon.

Locality: None designated.

Lithologic Characteristics: The Fish scale sands are characteristically poorly sorted, subangular to sub-rounded and light colored, with a calcareous cement. They have been described locally as subgreywacke, subquartzose quartz-chert sand, and salt and pepper sand. The upper part of the Fish scale zone tends to be shaly, and contains orange, chitinous, platy remains tentatively assumed to be fossil fish scales. However, the fish scale sand marker horizon is taken at the base of the fish scale zone. Here the sandstone is better developed and contains abundant, easily recognized fish scales. The sand development disappears toward Peace River, but the fish scales have been recognized as far north as Fort Nelson.

Thickness and Distribution: The best development is around Central Alberta where the fish scale sand is about 30 feet thick. The Fish Scale sandstones of the Colorado Group have been recognized in well sections from Southern Alberta to the Peace River area, and in outcrops in the foothills of Southern Alberta. The correlative Fish Scale zone of the Mowry Formation is well developed in Montana and Wyoming.

Relation to other Units: The Fish Scale zone is overlain by dark grey, marine, Colorado shales, which are in turn overlain by the second white speckled shale zone. Underlying the fish scale sandstone is about 50 to 150 feet of grey, silty, marine Colorado shales. These in turn overlie the Viking sandstone.

Palaeontology: Apart from the abundant fish scales, no fauna has been described from the fish scale sandstone. The Mowry formation of Montana, Wyoming, Dakota is probably partly correlative. The fish scale marker is replaced by the spore zone at the top of the fish scale sands in the Peace River area.

Comments: The fish scale sandstone gives a distinct, positive kick on radioactive logs which is widely recognized.

References:

John Paul Gries (1954) Cret. Rocks of Williston Basin, Bull. A.A.P.G. Vol. 38, No. 4, April 1954.

Eugene S. Perry (1953) Oil and Gas in Montana Memoir 35, Bureau of Mines and Geology, Montana.

Prepared by: Gulf Oil Company, Calgary, June 1954.

FLUME FORMATION: Middle or Upper Devonian

Author: Raymond, P. E., 1930, The Paleozoic Formations in Jasper Park, Alberta. Amer. Jour. Sci. 5th series, Vol. xx, No. 118, pp. 294-295.

Location: Type section at Roche Miette, Jasper National Park, Alberta. Numerous other outcrop sections are in the Rocky Mountains north from the Crowsnest Pass area to at least Jasper National Park area.

Lithologic Characteristics: The type section was originally described as being grey, sparingly fossiliferous, hard limestones and dolomites. Subsequent work has revealed that the Flume may be divided into two members. The lower member generally consists of limestones and dolomites, grey to black, medium to thick bedded; stromatoporoidal and coral reefs are common and occasional detrital or silty zones occur, though mainly in the lower part. However, in the North Saskatchewan Gap area this member is represented by a series of thinly bedded shales and argillaceous limestones. The upper member is limestone, dark grey, argillaceous, medium bedded, commonly fossiliferous, with several beds of black shale. The upper and lower members both become increasingly stromatoporoidal on approaching an area of carbonate development (Fairholme), thereby breaking down any distinction between them.

Thickness and Distribution: The type section is 150' thick. However, a thickness of more than 550' has been reported in other areas. A 300' section is exposed at Mountain Park and a 400' section at North Ram River.

Relation to other Units: The Flume is overlain conformably by the Perdrix formation. It is reportedly underlain nonconformably or disconformably by pre-Devonian formations ranging from Ghost River to dolomites of presently unknown age. It is equivalent stratigraphically to the Lower Fairholme into which it grades laterally without a major lithologic change. It reportedly correlates with the Beaverhill Lake formation of the Edmonton area and the Waterways formation of northeast Alberta. The Flume is part of the lower Minnewanka of Shimer (Shimer, H. W., 1926, Bull. G. S. C. No. 42 pp. 1 - 89), which in turn is part of the Intermediate Limestone Series of McConnell (McConnell, R. G., 1887, G.S.C.N.S. Vol. 2, 1886, Rept. D.).

References:

Fox, F. G., 1951, Devonian Stratigraphy of Rocky Mountains and Foothills, between Crowsnest Pass and Athabaska River, Alberta, Bull. A.A.P.G. Vol. 35, pp. 822-843.

de Wit, R. and McLaren, D. J., 1950, Devonian Sections on the Rocky Mountains between Crowsnest Pass and Jasper, Alberta, G.S.C. Paper 50-23.

McLaren, D. J., 1953, Summary of the Devonian Stratigraphy of the Alberta Rocky Mountains, A.S.P.G. Field Conference and Symposium.

Prepared by: C. E. Baynham, Seaboard Oil Company, Calgary, July 1954.

FOREMOST FORMATION: Belly River series, Upper Cretaceous

Authors: Dowling, D. B. (1915), Geol. Surv. Sum. Rept. Foremost beds raised to formation status by Russel, L. S. and Landes, R. W. (1940), Geol. of Southern Alberta Plains.

Locality: Type locality is in Chin Coulee near the town of Foremost, Southern Alberta.

History: It should be noted that Dawson (1882) included the Milk River beds, the Pakowki shales, and what is now known as the Foremost and Oldman formation, in his Belly River series, that is, all the beds between the Alberta formation and the Bearpaw formation. Williams and Dyer (1930) restricted the term Belly River to the Foremost and what is now known as the Oldman formation. Russel and Landes (1940) raised the Foremost and Oldman to formation status.

Lithologic Characteristics: Crockford, M.B.B. (1949) states in his description of the Foremost formation, "At the top there is generally a zone composed of coal seams and carbonaceous shales. This zone ranges from 80 to 220 feet in thickness, and is given such local names as Taber coal horizon, Grassy Lake lignite member and Redcliff coal zone. Below this is a zone composed of sandstone, shales, Ostrea and Corbula beds, with a few beds of carbonaceous shale. This zone is 100-250 feet thick. On the west flank of the Sweetgrass arch this is underlain by another coal zone approximately 30 feet thick. This lowest zone is called the McKay coal horizon and loses its identity eastward as it passes into marine equivalents of the Pakowki formation. The McKay coal horizon is underlain by the basal Foremost sandstone locally called the Verdigris sandstone, from its occurrence in Verdigris Coulee near Milk River Town".

Thickness and Distribution: The principal outcrop area lies between Lethbridge to the west, Medicine Hat to the east and the Milk River area to the south. To the north, the formation outcrops in the valleys of the South Saskatchewan and Oldman Rivers, and the Bow River as far north as Eyremost. The thickness ranges from 550 feet in the vicinity of Lethbridge to 350 feet near Medicine Hat and 240 feet in the Milk River gorge.

Relation to other Units: Overlain by the Oldman formation and underlain by marine Pakowki shales. The contact with the Oldman is taken at the uppermost good coal seam in the Foremost. At the base of the Foremost is the Verdigris sandstone, a salt-and-pepper sand of wide distribution.

Fauna: Brackish and fresh water pelecypods make up a rich fauna of Santonian age. Brackish water pelecypods predominate, being represented by Corbula, Ostrea, Anomia, Corbicula, and Volsella. The fresh water forms include Fusconia, Quadrula, Elliptio, and the sparse marine fauna is represented by forms such as Nucula, Yoldia and Pteria. The gastropods Hydrobia, Viviparus, Campeloma, Velatella, Malania and the marine form Polinices have been collected from the formation.

References:

Crockford, M.B.B. (1949) Bull. A.A.P.G. Vol. 33, No. 4, pp. 500-510.
Williams, M.Y. and Dyer, W.S. (1930) G.S. Mem. 163.
Furnival, G.M. (1946) G.S. Mem. 242.

Prepared by: Gulf Oil Company, Calgary, June 1954.

FORT CREEK FORMATION: Upper Devonian

Author: Kindle and Bosworth, 1920, Can. Geol. Survey, Summ. Report, 1920, Part B.

Locality: On the Fort Creek (Thunder Creek) River, near the site of old Fort Good Hope.

Lithologic Characteristics: Essentially greenish marine shales with local sand lenses and a reefoid limestone development in the lower part.

Thickness and Distribution: At Fort Creek there is 385'-540' of lower shale, 0-410' of reef limestones, 100'-400' of bituminous shales, and 700'-800' of upper shales. The maximum total thickness of 1800' occurs in the vicinity of Norman Wells. In the Norman Wells field 75'-125' of bedded limestones are overlaid by a true reef of stromatoporoids, corallites and coral sand. These shales lie horizontal and occupy a large area north of the Arctic circle. In the vicinity of the Alcan Highway, the formation consists of 800' of thin bedded, black, pyritic shale.

Relation to other Units: Rests on Ramparts formation and is overlaid by the Imperial formation around Norman Wells and unconformably by the Mississippian in north-central B.C.

References:

Stewart, J. S., 1945, Recent Exploratory Deep Well Drilling in Mackenzie River Valley, N.W.T., Can. Geol. Survey Paper 45-29.

Laudon and Chronic, 1949, Paleozoic Stratigraphy along the Alaska Highway, Bull. A.A.P.G. Vol. 33, pp. 195-219.

Kingston, D. R., 1951, Stratigraphic Reconnaissance along the Upper South Nahanni River, N.W.T., Bull. A.A.P.G. Vol. 35, p. 2224.

Hume and Link, 1945, Geol. Survey of Canada, Paper 45-16.

Prepared by: Canada-Cities Service Petroleum Corporation, Calgary, June 1954.

FORT MOUNTAIN FORMATION: Lower Cambrian of the Rocky Mountains in the vicinity of the Kicking Horse Pass, Alberta and British Columbia.

Author: (1) Walcott, C.D. (1912), Cambrian Brachiopoda, U.S. Geol. Survey, Mon. 51, p. 131, footnote "a".
(2) Deiss, Charles (1939), Cambrian Formations of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Amer. Bull., Vol.50, pp. 994-997.

Type Locality: Redoubt Mountain (formerly Fort Mountain), five miles northeast of Lake Louise station, Alberta.

History: Walcott (1912) named and defined the formation, Deiss (1939, pp. 994-996), however, stated that a clearly specified and measured section of the Fort Mountain formation had never been published, and he amended the definition.

Locality: Ptarmigan Peak, six miles northeast of Lake Louise station, Alberta.

Lithologic Characteristics: Thick and thin bedded, grey, white-grey, and tan-grey quartzitic and impure sandstones, interbedded with arenaceous shales and occasional beds of pure quartzite. Locally there is a basal conglomerate. The formation can be divided into five members; the uppermost being the Lake Louise shale. Fossils are unknown in the Fort Mountain formation other than Scolithus and Cruziana.

Thickness and Distribution: Deiss measured a thickness of 865 feet, including 60 feet of Lake Louise shale, in the type section on Ptarmigan Peak. Walcott (1928, p. 298) measured 526 feet of Fort Mountain in the Mount Assiniboine

Relation to Other Units: Overlies the Hector formation (Precambrian) unconformably and is overlain conformably by the St. Piran formation (of Walcott or Deiss). Deiss (1940, p. 768) assigned the beds in the Mt. Assiniboine area to his new Gog formation. North and Henderson (1954) include the Fort Mountain, Lake Louise and St. Piran in their redefined St. Piran formation.

References:

Deiss, Charles (1940) Lower and Middle Cambrian Stratigraphy of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Am., Bull., Vol.51, pp. 731-794.

Fox, F.G. (1953) Glossary of Formation Names of Southwestern Alberta, Alberta Society of Petroleum Geologists, 3rd Annual Field Conference and Symposium, Guide Book, p. 185.

North, F.K. & Henderson G.G.L. (1954) Summary of the Geology of the Southern Rocky Mountains of Canada, Alberta Society of Petroleum Geologists, Fourth Annual Field Conference, Guide Book, pp. 44-47.

Walcott, C.D. (1928) Pre-Devonian Paleozoic Formations of the Cordilleran Provinces of Canada, Smithsonian Misc. Coll., Vol. 75, p. 254, 281, 298, 303 and 314.

Prepared by: E. Atkinson, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

FRENCHMAN FORMATION: Upper Cretaceous

Author: Furnival, G. M. (1946) Cypress Lake Map Area, Sask. G.S. Memoir 242.

Locality: Along Frenchman River between Eastend and Ravenscrag, southwest Saskatchewan.

History: Beds belonging to the Frenchman formation were called Division B of the Tertiary Lignite by Dawson (1875), Laramie by McConnel (1885), and Lance by Rose (1916). These beds were included in the Ravenscrag formation defined by Davis in 1918. McLearn (1929) and Fraser et al (1935) described upper and lower divisions of the Ravenscrag. Furnival (1946) raised the Lower Ravenscrag to formation status, and named it the Frenchman formation after the good exposures in the Frenchman River. The name Ravenscrag formation was retained for the former upper Ravenscrag.

Lithologic Characteristics: Furnival comments: "The formation is composed essentially of sandstone that is massive, fine to coarse grained, coarsely cross-bedded, compacted to hard, greenish brown to brown, clean, and generally well sorted .... Intercalated with the thick sandstone lenses and commonly occurring at the top of the formation are beds of greenish grey to green, bentonitic shale, silt and fine, shaly sand".

Thickness and Distribution: 10' to 200' in the Cypress Hills area of Southern Saskatchewan and Alberta. The thickness is controlled by the topography of the erosion surface upon which the Frenchman sediments were deposited.

Relation to other Units: The coal bearing Ravenscrag formation overlies the non-coal bearing Frenchman formation, and the upper contact is taken at the appearance of the first coal seam. The dinosaur remains that characterize the Frenchman formation do not appear above the first coal seam of the Ravenscrag. The Frenchman formation is underlain by the green shales and silts of the Battle formation. The contact is marked by a widespread erosional unconformity the depth of erosion being as much as 200 feet. Where erosion has been insignificant, the base of the lowest thick sandstone bed in the Frenchman formation is taken as the contact with the Battle formation. Fraser et al (1935) correlate the Frenchman formation with the Hell Creek, a lower part of the Lance formation of Northeastern Montana.

Palaeontology: The Frenchman formation is rich in Dinosaur bones. The remains of the following have been identified: Lepisosteus, Myladaphus, Acapherpeton, Baena, Thescelus, Iguanavus, Lancesaurus, Triceratops, Ornithomimus, Crocodylus. A flora has described and includes Aralia, Eunonymus, Picus, Fraxinus, Ginkgo, Juglans, Pterospermites, Rhamnus and Viburnum.

References:

Dawson, G. M. (1875) Rept. on the Geol. & Res. in the Region in the Vicinity of the 49th parallel; Brit. N. America. Boundary Commission, Montreal, 379 pp.
McConnel, R. G. (1885) Rept. on the Cypress Hills, Wood Mountain and adjacent Country. G.S. Canada, Ann. Rept., Part C.
Rose, B. (1916) Wood Mountain-Willowbunch coal area, Sask. Geol. Surv., Canada, Memoir 89.
Davis, N. B. (1918) Rept. on the Clay resources of S. Sask. Dept. of Mines, Canada, Mines Branch, No. 468.
McLearn, F. H. (1929) S. Sask. G.S. Canada Sum. Rept. 1928, Pt. B. pp. 30-44.
Fraser, et al (1935) Geol. of S. Sask. G.S. Memoir 176.
Russel, and R. W. Landes (1940) G.S. Memoir 221.
M. Y. Williams, and W. S. Dyer (1930) G.S. Memoir 163.

Prepared by: Gulf Oil Company, Calgary, June 1954.

GENERAL PETROLEUM SAND: Tovell Member, Lower Cretaceous

Author: Wickenden, R.T.D. (1948), Geol. Surv. Canada, Paper 48-21, pp. 7-8.

Locality: General Petroleum #1, Lsd. 16, Sec. 14, Twp. 49, Rge. 1 W4, has been mentioned as having a good development of this sand.

Lithologic Characteristics: Wickenden states "A sand that occurs below a marine shale near the top of the Tovell member is known locally as the 'General Petroleum Sand'." It is a very fine-grained quartz sand, and in some wells is saturated with oil.

Distribution and Thickness: The General Petroleum sand has been described in the Lloydminster area. A thickness of about 50 feet has been recorded.

Relation to other Units: The Tovell Member is part of the "middle division" of Wickenden of the Mannville Formation of the Lower Cretaceous in this area. Overlain by the Borradaile Member and underlain by the Islay Member.

Prepared by: Canadian Gulf Oil Company, Calgary, July 1954.

GETHING FORMATION: Bullhead Mountain Group, Lower Cretaceous

Author: McLearn, F. H. (1922), Peace River Coal Area, B.C., G.S. Canada, Sum. Rept., Part B.

Locality: Peace River Canyon west of Hudson Hope on the north bank of the river westward from Grant Flat and up Aylard Creek.

Lithologic Characteristics: (McLearn and Kindle, 1950) "It consists of beds of sandstone, fine to medium grained, thin to massively bedded, with local development of cross-bedding, the sandstone usually being interbedded with grey to black, arenaceous to carbonaceous, fissile shale. No conglomerates are present but scattered pebbles occur in an 18" sandstone bed at the top of the formation. The Gething is differentiated from the underlying Dunlevy Formation on the basis of its fine sediments consisting of shales and fine grained sandstones with no conglomerates and the presence of coal. At least sixty coal seams ranging in thickness from less than 1' to over 4' occur throughout. Abundant plant remains, dinosaur tracks, and the absence of marine fossils, indicate a non-marine origin for the Gething formation.

Thickness and Distribution: The thickness is approximately 1,400' at the type section. The Gething occurs in the eastern Peace River Foothills, being particularly well exposed in Peace River Canyon. It extends as far east as Pouce Coupe, and probably farther, and as far south as the Kakwa Lake-Copton Creek area.

Relation to other Units: The Gething is overlain conformably by the Moosebar formation of the Fort St. John Group. The contact of the Gething sandstones with the overlying Moosebar shales is abrupt. An interval of erosion prior to deposition of the Moosebar formation is indicated by the presence of a conglomerate at the contact of the Gething and Moosebar formations. The lower contact with the Dunlevy formation is gradational. Coarse grained sandstones and conglomerates are referred to the Dunlevy formation while fine grained sediments with coal seams are referred to the Gething. McLearn and Kindle (1950) correlate the Gething formation with the Lower Blairmore of the southern foothills, with the Luscar formation of the Central Alberta foothills, with the lower part of the Loon River formation of the Lower Smoky River, and with the McMurray formation and the lower part of the Clearwater formation of the Lower Athabaska River.

Palaeontology: Abundant plant remains, dinosaur tracks, and the absence of marine fossils, indicate mostly a non-marine origin for the Gething formation.

References:

McLearn, F. H. and Kindle, E. D. (1950), Geology of Northeastern British Columbia, Geol. Surv. Canada, Mem. 259, p. 63.

Prepared by: Canadian Gulf Oil Company, Calgary, July 1954.

GHOST RIVER FORMATION: Age uncertain, possibly Lower Middle Devonian.

Author: C. D. Walcott, 1923, Nomenclature of some Post Cambrian and Cambrian Cordilleran Formations (2), Smith, Misc. Coll., Vol. 67, No. 8, pp. 463-464.

Locality: Ghost River Canyon, 14 miles north of Exshaw, Alberta.

History: Beach, 1943, pp. 9-10, tentatively identified his Formation D with the Ghost River; however only the top 140½ feet of the Fairholme Mountain section, which he quotes as typical of Formation D, may be correlated with the Ghost River formation, the remainder of Formation D being Middle Cambrian as proven by the trilobite faunas contained therein.

Lithologic Characteristics: Buff to pinkish buff and occasionally light grey, dense to microcrystalline, thick bedded siltstones and silty dolostones, containing zones of breccia and thin bands of red and green shales. Fossils have not been obtained from this formation. The white siltstones which Severson, 1950, reports from the base of the Devonian at Sunwapta Pass, are probably Ghost River.

Thickness and Distribution: The thickness at the type section is 285 feet; elsewhere it is often difficult to pick the base of the Ghost River because of the absence of faunal control. The formation averages 250 feet in thickness. It is distributed through much of the Rocky Mountains where Devonian sections occur.

Relation to other Units: It is overlain by the fossiliferous cherty limestones or dolostones of the Fairholme formation. It may rest disconformably and often unconformably on strata whose age may vary from Middle Cambrian to Silurian. It is probable that it is the basal deposit of the transgressive Lower - Middle Devonian sea, and it is possibly a time equivalent to the Elk Point formation (McGehee, 1949) (Warren, 1927).

[redacted]:

Beach, H. H., 1943, Moose Mountain and Morley Map-Areas, Alberta, Dept. Mines and Resources, Geol. Survey, Mem. 236.

de Wit, R. and McLaren, D. J., 1950, Devonian Sections in the Rocky Mountains between Crows Nest Pass and Jasper, Alberta, Geological Survey of Canada, Paper 50-23, 8.

McGehee, J. R., 1949, Pre-Waterways Palaeozoic Stratigraphy of Alberta Plains, Amer. Assoc. Pet. Geol. Bull., Vol. 33, No. 4.

Warren, P. S., 1927, Banff Area, Alberta, Geological Survey of Canada, Mem. 153, pp. 13-14.

Severson, J. L., 1950, Devonian Stratigraphy, Sunwapta Pass Area, Alberta, Canada, Amer. Assn. Petrol. Geol. Bull., Vol. 34, No. 9, pp. 1830-1831, 1840.

Prepared by: P. W. Taylor, Shell Oil Company, Calgary, July 1954.

GLAUCONITIC SAND SERIES: Lower Cretaceous

Author: Layer, D. B. et al (1949), Bull. A.A.P.G., Vol. 33, No. 4, pp. 580-82, p. 595.

Locality: The series has been described from the Stettler and Edmonton areas.

History: The Lower Cretaceous sands, shales and coals of the Stettler and Edmonton areas have been divided into 3 zones by various authors, Layer (1949), Hunt (1950), and Lockwood, Erdman (1951). The following division by Layer (1949) is representative: Coaly Series, Glauconitic sand series, Quartz sand series.

Lithologic Characteristics: Generally, the glauconitic sand series includes the sediments from the top of the glauconitic sandstone to the base of the Ostracod zone in the lower Cretaceous. The sediments between these markers are fossiliferous, grey to black, brackish-water shales, limestones, and salt and pepper, fine to medium grained, marine glauconitic sands.

Thickness and Distribution: From the Stettler and Edmonton areas the series appears to extend as far east as the Saskatchewan boundary and as far north as the Lesser Slave Lake. The thickness is variable, due to lensing. A thickness of about 70' has been recorded from the Edmonton area.

Relation to other Units: The Glauconitic Sand Series is overlain by the Coaly Series and underlain by the Quartz sand series or "Ellerslie Member". The Coaly Series contains predominantly non-marine sands, shales and coal. The top of the underlying quartz sand series is a vitreous pure quartz sand or silt. Badgley (1952), considers the glauconitic Sand Series to be correlative with the Islay member of Eastern Alberta and considers it the Wabiskaw member of the Clearwater formation in Central Alberta. It appears to be at least partially equivalent to the Bluesky formation of the Peace River area.

Palaeontology: An abundance of ostracods, pelecypods and gastropods are found in the ostracod zone which marks the basal unit of the Glauconite Sand Series.

References:

Badgley, Peter C. (1952), Geol. Surv. Canada, Paper 52-11.
Hunt, C. W. (1950), Bull. A.A.P.G., Vol. 34, No. 9, pp. 1795-1801.
Lockwood, R.P. and Erdman, O. A. (1951), Bull. A.A.P.G., Vol. 35, No. 4, pp. 872-73.
Loranger, D. M. (1951), Bull. A.A.P.G., Vol. 35, No. 11, pp. 2348-2352.

Prepared by: Canadian Gulf Oil Company, Calgary, July 1954.

GRAMINIA MEMBER: Winterburn formation, Upper Devonian

Author: Geological Staff, Imperial Oil Ltd., 1950, Devonian Nomenclature in Edmonton Area, Alberta, Canada, Amer. Assoc. Pet. Geol. Bull., Vol. 34, No. 9, pp. 1813–1815.

Locality: Interval 4815 feet to 4865 feet, B.A. Pyrcz No. 1 well, Lsd. 12, Sec. 25, Twp. 50, Rge. 26 W4 Meridian.

Lithologic Characteristics: Buff, crystalline, silty dolostones are typical of this member but in the type section it is predominantly of anhydrite with subordinate amounts of siltstone and silty dolostones. The member becomes progressively more anhydritic south of the type section.

Thickness and Distribution: 50 feet thick in the type section but the thickness may vary from 0 feet to more than 60 feet. The Graminia has a wide distribution in Alberta.

Relation to other Units: At the type section the Graminia rests on the siltstones of the Calmar member of the Winterburn formation and is overlain by the dense limestone or dolomitized limestone of the Wabamun formation; elsewhere, viz. near Hanna, the Graminia may overlie an anhydrite which may be Calmar or Nisku equivalent. The Graminia is the equivalent of the Upper Alexo in the Rocky Mountains.

References:

Belyea, H. R., 1952, Notes on the Devonian System of the North-Central Plains of Alberta, Geol. Surv. Can., Paper 52-27.

Prepared by: P. W. Taylor, Shell Oil Company, Calgary, July 1954.

GRAND RAPIDS FORMATION: Lower Cretaceous

Author: McConnell, R. G. (1893), Report on a Portion of the District of Athabaska Comprising the Country between Peace River and Athabaska River North of Lesser Slave Lake, Geol. Sur. Can., Vol. 5, Pt. D., pp. 30D-32D, 55D-58D.

Locality: Exposed along Athabaska River near Grand Rapids.

Lithologic Characteristics: Badgley states that the formation is "a complex succession of interbedded greywackes, siltstones, and shales with several thin coal beds. Locally it contains a few thin winnowed greywackes and several persistent quartzose sandstone units appear toward the east and southeast. With the exception of these quartzose sandstone units the other lithological components usually exhibit extreme lateral lenticularity". The sandstone units are given member status.

The St. Edward member (Colony sandstone) about 50 feet thick is in the top portion, the Borradaile member (Sparky sandstone) lies in the central portion, and the Islay member lies at the base (Glauconitic sandstone equivalent). The Looma member, consisting of interbedded soft dirty coal, carbonaceous shale, and occasional greywacke beds lies below the Borradaile member. It would appear that when the Grand Rapid-Clearwater lithofacies contact shifts up-section, this shaly member lies within the underlying Clearwater formation.

Thickness and Distribution: It varies from approximately 400 feet on the Athabaska River to 250 feet in the Edmonton-Clyde area. It is recognizable throughout central Alberta and grades into the lower sandstones of the Peace River formation and underlying unit of the Peace River area, the upper part of the Blairmore formation of southern Alberta foothills, and the upper Manville of the east-central Alberta Plains.

Relation to other Units: The Grand Rapids is equivalent to the upper part of the Manville Group and an Albian (Late Lower Cretaceous) age is indicated by its stratigraphic position. It is equivalent in part to the lower part of the Peace River formation, and to the upper part of Spirit River formation. It is equivalent to the upper part of the Blairmore formation of the southern Alberta foothills. The upper contact is marked by an abrupt change from the overlying marine strata of the Joli Fou formation to the non-marine strata of the Grand Rapids. The contact is locally represented by a thin chert pebble conglomerate. The lower contact is transitional with the lagoonal and offshore bar lithology of the underlying Clearwater formation. Badgley places the contact "at the top of a fossiliferous or highly glauconitic sandstone". Badgley further states that it might be "preferable to recognize these units as a combined Grand Rapids-Clearwater interval——".

Palaeontology: F. H. Mclearn has identified Pecten (Entolium) irenense, Pecten, n.sp.? and Nucula? sp., but no characteristic fossils have been reported.

References:

Badgley, P. C. (1952), Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, G.S.C. Paper 52-11.

Wickenden, R.T.D. (1949), Some Cretaceous Sections Along Athabaska River from the Mouth of Calling River to Below Grand Rapids, Alberta, G.S.C. Paper 49-15.

Prepared by: Canadian Gulf Oil Company, Calgary, July 1954.

GRINNELL FORMATION: Precambrian, Purcell Series. Clarke Range of Alberta and Montana.

Author: Willis, Bailey (1902), Stratigraphy and Structure of the Lewis and Livingstone Ranges, Montana; Bull. Geol. Soc. Amer., Vol. 13, p. 322.

Locality: Mount Grinnell, Montana.

Lithologic Characteristics: The Grinnell is predominantly red argillite, which commonly exhibits ripple marks, mud cracks and other evidences of shallow water deposition. Thin bands of green argillite and white, green, and red quartzites and conglomerates also occur.

In the Waterton area Daly reported, near the top of the Grinnell, a flow of basic, amygdaloidal lava, 20 feet thick.

Thickness and Distribution: In the type section 1800 feet; in Waterton area 750 to 1000 feet. This formation is known only in the Clarke Range (Lewis Overthrust sheet) in Alberta.

Relation to Other Units: Succeeds the Appekunny formation conformably; overlain conformably by the Siyeh formation.

References:

Clapp, C.H. (1932), Geology of a Portion of the Rocky Mountains of Northwestern Montana; Montana Bur. Mines and Geology, Memoir No. 4.

Daly, R.A. (1912), Geology of the North American Cordillera at the Forty Ninth Parallel; Geol. Surv. Canada, Memoir 88, p. 70.

Douglas, R.J.W. (1952), Waterton, Alberta; Geol. Surv. Canada, Paper 52-10.

Prepared by: F. G. Fox, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

GRIZZLY BEAR MEMBER: Belly River formation, Montana group, Senonian Stage, Upper Cretaceous series.

Author: Slipper, S. E., 1917, Viking Gas Field, Structure of Area, Geological Survey Summary Report, 1917 Part C, p. 8.

Locality: Grizzly Bear Coulee, Twp. 47, Rge. 5 W4, Alberta.

Lithologic Characteristics: Dark blue-grey marine shale, contains ironstone and sandstone nodules; some beds of incoherent sandstone.

Thickness and Distribution: 0 - 140', East-Central Alberta.

Relation to other Units: Rests on sandstone of the Ribstone Creek member and is overlain by sandstone of the Birch Lake member. Together with these two members it is considered equivalent to the Foremost formation of Southern Alberta.

References:

Hume, G. S., 1924, Oil and Gas Prospects of the Wainwright - Vermilion Area, Alberta, G.S.C. Summary Report, 1924, Part B, p. 6.

Hume, G. S. and Hage, C. O., 1941, The Geology of East-Central Alberta, G.S.C. Memoir 232, pp.27-29.

Nauss, A. W., 1945, Upper Cretaceous Stratigraphy of Vermilion Area, Alberta, Amer. Assoc. Petrol. Geol. Bull. Vol. 29, No. 11, pp. 1605-1629.

Shaw, E. W. and Harding, S.R.L., 1948, Lea Park and Belly River Formations of East-Central Alberta, Amer. Assoc. Petrol. Geol. Bull., Vol. 33, No. 4, pp. 487-499.

Williams, M. Y. and Dyer, W. S., 1930, Geology of Southern Alberta and Southwestern Saskatchewan, G.S.C. Memoir 163, pp. 26-27.

Prepared by: M. Love, Canadian Superior Oil of California, Ltd., Calgary, June 1954.

HARMON MEMBER: Peace River Formation, Fort St. John Group, Lower Cretaceous

Author: Crickmay, C. H., Imperial Oil Limited, Company Report.

Locality: East bank Peace River, 3.4 miles below bridge at Peace River, Alberta, distance measured following river curves on the east bank. Sec. 21, Twp. 84, Rge. 21 W5 Meridian, Alberta.

Lithological Characteristics: Dark grey, non-calcareous, fine grained, clay, firm, thin bedded to fissile marine shale. Commonly includes thin grey bentonitic shale interbeds and in some areas occasional thin interbeds of sandstone and siltstone.

Thickness and Distribution: 30 - 110'. At locality NE ¼ Sec. 25, Twp. 85, Rge. 21 W5th Meridian the thickness is 34'.

Relation to other Units: Rests conformably on sands of the Notikewin member of the Spirit River formation, Fort St. John group and is overlain by Cadotte member of Peace River formation. May be equivalent to the Joli Fou and Basal Colorado shale of Central and Northern Alberta.

References:

Badgley, Peter C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of The Lower Cretaceous Series in Central Alberta, Geological Survey of Canada, Paper 52-11, pp. 7-8.

Wickenden, R.T.D., 1951, Some Lower Cretaceous Sections on Peace River below the mouth of Smoky River, Alberta, Geological Survey of Canada, Paper 51-16, pp. 14-15.

Alberta Study Group, 1954, Lower Cretaceous of the Peace River Region, Western Canada Sedimentary Basin, Amer. Assn. Petrol. Geol., Tulsa, Okla.

Prepared by: A. J. Beverage, Canadian Superior Oil of California Ltd., Calgary, July 1954.

HAY RIVER FORMATION: Late Devonian, northern Alberta and southern part of Northwest Territories.

Author: First described by Cameron, A. E., 1918, Exploration in the vicinity of Great Slave Lake, Geol. Surv. Can., Summ. Report, 1917, Pt. C.

Locality: Hay River, N.W.T. north of Louise Falls.

History: Generally known as Hay River shale of Cameron.

Lithologic Characteristics: Predominantly greenish-grey, slightly calcareous to calcareous shale with thin, fossiliferous limestone beds occurring at widely separated intervals in the lower part; limestone beds become thicker and more closely spaced in the upper part; the uppermost 150 feet are composed of interbedded argillaceous limestone and shale, several silty bands and several thin coral biostromes.

Thickness and Distribution: 1,300 feet thick at its type locality along Hay River.

Relation to other Units: Disconformably overlies the Middle Devonian Slave Point formation and its equivalent at the base of the Beaverhill. Roughly equivalent to the combined Woodbend and Beaverhill formations (excluding the lowest limestone member of the Beaverhill) to the south, and to the Fort Creek formation to the north. Correlated with some middle part of the Hay River formation is the Simpson formation of Cameron (1918). The Waterways formation of Warren can be correlated with lower half of the Hay River formation.

References:

Whittaker, E. J., 1922, Mackenzie River district between Great Slave Lake and Simpson, Geol. Surv. Can., Summ. Rept. 1921, Pt. B.

Stewart, J. S., 1947, Exploration for Petroleum, N.W.T., 1946, Geol. Surv. Can., Paper 47-2.

Warren, P. S. and Stelck, C. R., 1950, Succession of Devonian faunas in western Canada, Roy. Soc. Can., Trans., 3rd ser., Vol. 44, Sec. 4, pp. 61-78.

Prepared by: H. G. Bassett, Shell Oil Company, Calgary, July 1954.

HECTOR FORMATION: Uppermost Precambrian of the Rocky Mountains of the Upper Bow Valley and adjacent parts of Banff National Park, Alberta.

Author: Walcott, C.D. (1910), Precambrian Rocks of the Bow River Valley, Alberta, Canada, Smithsonian Misc. Coll., Vol. 53, p. 427.

Type Locality: Redoubt Mountain (formerly Fort Mountain) five miles northeast of Lake Louise station, Alberta.

Lithologic Characteristics: Green, red and purple, sandy and siliceous shales; two intraformational conglomerates, one 110 feet below the top, composed of thin layers of pink limestone in a fine sandy matrix, the second 820 feet from the top, composed of quartz pebbles and pink limestone in a sandy matrix.

Thickness and Distribution: In the type section, more than 1300 feet; on the northeast ridge of Mount Temple near Lake Louise, more than 2150 feet; on the north side of Mount Assiniboine, more than 250 feet.

Relation to Other Units: Underlain conformably by Corral Creek formation. Overlain unconformably by Fort Mountain formation. Walcott suggested correlation with the uppermost part of the Kintla formation of the Waterton Lakes district. Walker (1926, p. 19) and others show better evidence for correlation with the Horsethief Creek formation of the Windermere district.

References:

Deiss, Charles (1939), Cambrian Formations of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Amer. Bull., Vol. 50, pp. 975, 996, 1011-1012.

Deiss, Charles (1940), Lower and Middle Cambrian Stratigraphy of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Amer. Bull., Vol. 51, pp. 768-770.

For, F.G. (1953), Glossary of Formation Names of Southwestern Alberta, Alberta Society of Petroleum Geologists, 3rd Annual Field Conference and Symposium, Guide Book, p. 185.

Walcott, C.D. (1928), Pre-Devonian Paleozoic Formations of the Cordilleran Provinces of Canada, Smithsonian Misc. Coll., Vol. 75, pl. 60. (Written by C.E. Resser after Walcott's death, from Walcott's notes and publications).

Walker, J.F. (1926), Geology and Mineral Deposits of Windermere Map-area, British Columbia, Geol. Surv Canada, Mem. 148, pp. 17-19.

Prepared by: E. Atkinson, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

HIGHWOOD SANDSTONE: Upper Alberta Shale, Montana, Upper Cretaceous

Author: Literature available at this time to the writer does not indicate who named this member.

Locality: On Highwood River, Southwest quarter of Sec. 30, Twp. 18, Rge. 2 W5.

Lithologic Characteristics: Buff weathering, fine, hard sandstone and sandy shales containing ironstone concretions and generally overlain by a thin band of conglomerate composed of vari-colored chert and quartzite pebbles.

Thickness and Distribution: 0 - 100', characterized by more or less local development throughout south-central Alberta foothills area, best known in Turner Valley area.

Relation to other Units: Overlies the lower part of Upper Alberta marine shales and is overlain by Upper Alberta marine shales and soft sandstones. Has been correlated with the Solomon and Milk River (Eagle) sandstones.

References:

Gallup, W. B., 1951, Geology of Turner Valley Oil and Gas Field, Alberta, Canada, A.A.P.G. Bull., Vol. 35, No. 4, p. 802.

Hume, G. S., 1938, The Stratigraphy and Structure of Southern Turner Valley, Alberta, G.S.C. Prelim. Report, Paper 38-22, p. 10.

Webb, J. B. and Hertlein, L. G., 1934, Zones in Alberta Shale in Foothills of Southwestern Alberta, Bull. A.A.P.G., Vol. 18, No. 11, p. 1402.

Prepared by: L. W. Bebensee, Canadian Superior Oil of California, Ltd., Calgary, June 1954.

HOME MEMBER: Blairmore Formation, Lower Cretaceous (Hauterivian)

Author: Not formally described in literature available and known to the writer.

Locality: Home No. 1 well in Lsd. 10, Sec. 20, Twp. 19, Rge. 2 W5 (Turner Valley Field) at 4,560' (Hume, 1938).

History: Originated as a driller's term for a sandstone encountered in a Home Oil Co. well in 1927 during the development of the Turner Valley Field.

Lithologic Characteristics: Light grey to white quartz sandstone, often calcareous and/or siliceous; may have interbedded dark grey micaceous, pyritic shale. The sand is commonly fine grained and glauconitic in the Western Plains area; when the sand lithofacies is not developed, the Home may be comprised of brown, lithographic limestone. Brackish to marine in origin.

Thickness and Distribution: Thickness about 50' in the Turner Valley area. Originally the term was confined to this area.

Relation to other Units: Appears to lie above the Ostracod shale and limestone member, thus apparently correlative with the "Glauconite Sand" of the Central Plains. May also correlate with the Bluesky Formation of the Peace River Area. The above correlations are not in agreement with the correlation chart by R. S. Lemon (1954).

References:

Douglas, R. J. W., 1950, Callum Creek, Langford Creek, and Gap Map-Areas, Alta., G.S.C. Mem. 255, p. 23.

Gallup, W. B., 1951, Geology of Turner Valley Oil and Gas Field, Alta., A.A.P.G. Vol. 35, No. 4, p. 802.

Hume, G. S., 1938, Turner Valley, Alta., G.S.C. Prelim. Paper 38-7, pp. 6, 12.

Lemon, R. S., 1954, Generalized Columnar Section, Alberta, A.S.P.G. News Bulletin, March, 1954.

Link, T. A., and Moore, P. D., 1934, Structure of Turner Valley Gas and Oil Field, Alta., A.A.P.G., Vol. 18, No. 11, pp. 1434-35.

Thompson, R. L., and Axford, D. W., 1953, Notes on the Cretaceous of Southwestern Alta., Third Annual Field Conference Symposium, pp. 32, 37.

Prepared by: G. E. Hargreaves, Canadian Superior Oil of California, Ltd., Calgary, July 1954.

IRETON MEMBER: Woodbend formation, lower Upper Devonian

Author: Geological Staff, Imperial Oil Ltd., 1950, Devonian Nomenclature in Edmonton Area, Alberta, Canada, Amer. Assoc. Pet. Geol. Bull., Vol. 34, No. 9, pp. 1816, 1818-1821.

Locality: Interval from 5065 feet to 5327 feet B.A. Pyrcz No. 1 well, Lsd. 12, Sec. 25, Twp. 50, Rge. 26, W. of 4 Meridian.

Lithologic Characteristics: Grey-green to greenish grey to brown calcareous or dolomitic shale, containing bands of limestone which are often richly fossiliferous, and occasional quartz silt stringers.

Thickness and Distribution: 262 feet thick at the type locality, but range of thickness may be from less than 10 feet to over 800 feet. The Ireton is present throughout most of Alberta and Western Saskatchewan, being thin in reef areas and thick in the shale basins.

Relation to other Units: The Ireton is overlain by dolostones of the Nisku member of the Winterburn formation (lower Upper Devonian) and may be underlain by the Leduc reef member, the Cooking Lake member, both of the Woodbend formation (lower Upper Devonian), or the Beaverhill Lake formation (Middle Devonian or lowest Upper Devonian). The Ireton is at least in part the time equivalent of the Leduc member.

References:

Newland, J. B., 1954, Interpretation of Alberta Reefs Based on Experience in Texas and Alberta: A.S.P.G. News Bull., Vol. 2, No. 9.

Prepared by: P. W. Taylor, Shell Oil Company, Calgary, July 1954.

ISLAY MEMBER: Manville (Blairmore) Formation, Lower Cretaceous

Author: Nause, A. W., 1945, Cretaceous Stratigraphy of the Vermilion Area, Alberta, Canada, Amer. Assoc. Petrol. Geol. Bull., Vol. 29, No. 11, pp. 1605-1629.

Locality: Northwest Manville #1 well, Lsd. 1, Sec. 18, Twp. 50, Rge. 8 W4, Vermilion Area of Alberta. No outcrops in the area of known extent.

Lithologic Characteristics: The Islay member consists largely of unconsolidated quartz sand. The grains are well sorted, rounded and somewhat frosted. Dark minerals are present only in small proportions. In the upper part several very thin coal seams are present.

Thickness of Distribution: 0 - 60'. Probably present in a number of wells in the Vermilion - Lloydminster area of East Central Alberta.

Relationship: The Islay member lies immediately below the Tovell member and rests on the marine shale and quartz sands of the Cummings member.

References:

Wickenden, R.T.D., 1948, Lower Cretaceous of the Lloydminster Oil and Gas Area, Alberta and Saskatchewan, Geological Survey of Canada, Paper 48-21.

Prepared by: Wilf Loucks, Canadian Superior Oil of California, Ltd., Calgary, July 1954.

JEFFERSON FORMATION: Upper Devonian

Author: Peale, A. C., 1893, U.S.G.S. Bull. 110.

Locality: Exposed in hills on both sides of Missouri River, just below junction of the Three Forks of the Missouri, and on both sides of the Jefferson a few miles above its mouth, in Three Forks quadrangle, S.W. Montana.

History: First named and described by Peale, A.C., 1893 placed in Middle Devonian. Cooper, G. A., 1942, placed the Jefferson in Upper Devonian.

Lithologic Characteristics: Brown and black crystalline limestone.

Thickness and Distribution: 640' thick, widespread in Montana, Western Wyoming, SE and S-central Idaho, Northern Idaho and Utah.

Relation to other Units: Overlain by Three Forks shale; conformably overlies Gallatin formation.

References:

Wilmarth, M. Grace, Lexicon of Geologic Names of United States, including Alaska, U.S.G.S. Bull. 896, 1938, P. 1041.

Cooper, G. A., Correlation of Devonian Sedimentary Formations of North America, A.A.P.G. Vol. 53, 1943.

Prepared by: R. A. Reed, Shell Oil Company, Calgary, July 1954.

JOLI FOU FORMATION: Late Lower Cretaceous

Author: Wickenden, R.T.D., 1949, Some Cretaceous Sections Along Athabaska River from the Mouth of Calling River to Below Grand Rapids, Alberta, Geol. Surv. of Canada, Paper 49-15, pp. 3, 16.

Locality: Along the Athabaska river between the Pelican Rapids and eight miles downstream from the Joli Fou Rapids. Joli Fou section No. 1 about 5½ miles below Joli Fou Rapids, in NW ¼ Sec. 22, or SW ¼ Sec. 27, Twp. 82, Rge. 17 W4th Mer. Joli Fou section No. 2 was studied near Joli Fou Rapids in the north-central part of the series of exposures on the east side of, and about 200 feet back f rom the Athabaska in the west-central part of Sec. 33, Twp. 81, Rge. 17 W5th Mer. Joli Fou Sec. No. 3 was studied in an exposure about 8 miles downstream from Joli Fou Rapids, on the east side of the valley in NW ¼ Sec. 35, Twp. 82, Rge. 17 W4th Mer. about 140' above the river.

History: The name Pelican shale was applied by McConnell (1893, pp. 28, 29) and used by McLearn (1917). For name change see Wickenden, 1949, p. 12.

Lithologic Characteristics: Dark grey non calcareous fissile marine shale, with minor lenses of fine to medium grained sandstone.

Thickness and Distribution: About 110 feet thick at the outcrop. It thins to about 35 feet south of the Lesser Slave Lake area, and to about 55' in the Redwater area. The formation apparently thickens again to the south and may include a lower portion of the Bow Island Sandstone series.

Relation to other Units: Underlies the Pelican sandstone and overlies the Grand Rapids formation in NE Alberta. Southerly the formation lies beneath the Viking and on top of the Mannville. To the west the formation appears to be transitionally related to the Harmon shale, though Badgley, who has made a study of the problem, disagrees with this.

References:

McConnell, R. J., 1893, G.S.C. Annual Report, New Ser., Vol. V, 1890, pp. 116-122 D.
McLearn, F. H., 1917, Athabaska River Section, Alta., GSC Summ. Rept. 1916, pp. 145-51.
Wickenden, R.T.D., G.S.C. Paper 48-21.
Badgley, P. C., 1954, Personal Communication.
Allan, J. A. and Rutherford, R. L., 1934, Geology of Central Alberta, Geol. Sur. Div., Univ. Alta.

Prepared by: Milton Fuglem, The Petroleum and Natural Gas Conservation Board, Calgary, July 1954.

JUMPING POUND SANDSTONE MEMBER: Lower Benton or Lower Alberta formation, Upper Cretaceous. General distribution: Southern and Central Foothills of Alberta.

Author: Link, T. A., 1929, Geology of the Jumping Pound Structure: Imperial Oil Review, April 1929.

Locality: Jumping Pound Creek, Louis Nickle farm, Lsd. 11, Section 31, Township 34, Range 4, West of the 5th Meridian. This type locality is 1½ miles north of Jumping Pound post office. From Cochrane, Alta., it can be reached by travelling 6½ miles south along the old Banff coach road and turning west for an additional 3½ miles.

Lithologic Characteristics: Brownish grey, fine grained, evenly bedded, ribboned, limey, ripple-marked sandstone interbedded with dark grey, micro-micaceous shale.

Thickness and Distribution: No thickness has been recorded at the type locality but at Shell Crossfield #1 (4-22-27-1 W5) and Shell Anglo Canadian Pine Creek #1 (12-12-20-2 W5) the electric logs indicate the zone to be approximately 200 feet thick. It is recognized in outcrop wherever enough of the "Lower Benton" section is exposed in the Central Foothills belt and is a prominent marker at the Jumping Pound and Turner Valley fields. The Jumping Pound sandstone is in part equivalent to the second speckled shale zone of the plains.

Relation to other Units: Approximately 400 feet below the Cardium formation (Upper Cretaceous) and about 400 feet above the "Grit Bed" (Lower Cretaceous).

References:

Hume, G. S., 1938, The Stratigraphy and Structure of Southern Turner Valley, Alberta, G.S.C. Preliminary Report 1938, Paper 38-22, page 4.

Hume, G. S., 1938, Turner Valley, Alberta, G.S.C. Preliminary Report, Paper 38-7, page 5.

Prepared by: Robert R. Williams, Petroleum and Natural Gas Conservation Board, Calgary, June 1, 1954.

KASKAPAU FORMATION: Smoky River group, Upper Cretaceous

Author: F. H. McLearn, 1926, Geol. Survey of Canada Bulletin 42: p. 117.

Locality: On the Peace river, vicinity of Dunvegan, the base outcrops at the top of the Dunvegan cliffs. On the Smoky river below Puskwaskau river to about 12 miles below Racing creek, this member is exposed on the valley sides.

History: The Smoky River group was first used by Dawson in 1879 for shale strata exposed on the Smoky river. This unit was subdivided in 1918 by McLearn into the following members: Upper Shale, Bad Heart sandstone and Lower Shale. In 1926 he assigned the name Kaskapau to the lower shale member. The Kaskapau is apparently derived from the term, "Ka-ska-pa-tē-sī-pī", Cree for Smoky river. Gleddie (1948) proposed formational status for the Kaskapau within the Smoky River group.

Lithologic Characteristics: Predominantly dark grey fissile carbonaceous shale, friable near the base, with varying amounts of ironstone concretions throughout. Sandstone lenses occur at and near the top and thin fine grained sandstone beds are found near the base.

Thickness and Distribution: The Kaskapau formation is about 520 feet thick on the Smoky river, and about 550' thick in the Sturgeon Lake area. At Wembley the formation is either thickened by lenses of sandstone or it interfingers with a late Dunvegan sandstone series. Warren and Stelck (1940) included the Pouce Coupe sandstone in the Kaskapau member.

Relation to other Units: Succeeds the Dunvegan sandstone and precedes the Bad Heart sandstone. The corresponding unit of the central plains occurs about 180' below the First White Specks and above the Second White Specks.

References:

Report on Progress, 1879-80, Dawson Brothers, p. 128B.
McLearn, F. H. 1918, Geol. Survey Can. Summ. Rept., p. 4C.
R. L. Rutherford, appendix P. S. Warren, p. 24, Geol. & Water Resources in Parts of the Peace River and Grande Prairie Districts Alberta.
McConnell, R. G., 1890, G.S.C. Annual Report, New Ser. Vol. V, p. 50D.
Joseph Gleddie, Upper Cret. in Western Peace River Plains, Alberta, A.A.P.G. Vol. 33, No. 4 (April, 1949) pp. 511-532.
Warren, P. S., and Stelck, C. R., 1940, Cenomanian and Turonain Faunas in the Pouce Coupe District Alberta and B.C., Trans. Roy. Soc. Can. Vol. 34.

Prepared by: Milton Fuglem, Petroleum and Natural Gas Conservation Board, Calgary, June 1, 1954.

KINTLA FORMATION: Precambrian, Purcell Series. This is the youngest Precambrian formation in the Clarke Range in Alberta.

Author: Willis, Bailey (1902), Stratigraphy and Structure of the Lewis and Livingstone Ranges, Montana; Bull. Geol. Soc. America, Vol. 13, p. 324.

Locality: Kintla Creek, near its source, Montana.

Lithologic Characteristics: Red argillaceous quartzite, siliceous shale, white quartzite, and a few calcareous beds, supposed to represent a muddy, ferruginous environment of deposition. Salt casts signify aridity and the red color is the result of subaerial oxidation.

Daly recognized four members at Waterton; a basal member of argillite, limestone, and quartzite (60 feet); a lava flow (40 feet); purplish sandstone and argillite, grey cherty oolitic limestone, and magnesian sandstone (300 feet); and red to brownish or purplish argillite and sandstone (460 feet). At Beaver Mines, Hage also recognized four members, all much thicker than those of Daly.

Thickness and Distribution: Thickness in the type section, 800 feet, with the top not observed; at Waterton 1500 feet plus; at Beaver Mines 2900 feet. The Kintla outcrops widely in the Lewis Overthrust sheet. It is not known outside the Clarke Range in Alberta.

Relation to Other Units: Conformably succeeds the Sheppard formation; it is overlain unconformably by Middle Cambrian beds in Beaver Mines area; no information in other areas.

References:

Daly, R.A. (1912), Geology of the North American Cordillera at the Forty Ninth Parallel; Geol. Surv. Canada, Memoir 88, pp. 81-83.
Hage, C.O. (1943), Beaver Mines; Geol. Surv. Canada, Map 739A.

Prepared by: F. G. Fox, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

KIPP SANDSTONE: Bearpaw formation, Upper Cretaceous

Author: Link, T. A. and Childerhose, A. J., 1931, Bearpaw Shale and Contiguous Formations in Lethbridge Area, Alberta, A.A.P.G. Bull., Vol. 15, No. 10, pp. 1232-36.

Locality: North Bank of Oldman River, 1½ miles southwest of Kipp station, Sec. 24, Twp. 9, Rge. 23 W4.

Lithologic Characteristics: Sandstone, coarse locally, with a lighter greenish blue tinge that distinguishes it from overlying parts of the darker Bearpaw shale.

Thickness and Distribution: 40 feet thick in the type section but thinner as exposed on St. Mary River to the south; distinct in the Lethbridge region and possibly as far south as Del Bonita.

Relation to other Units: Top lies 400 feet above base of Bearpaw and 150 feet below Ryegrass sandstone. Base lies 100 feet above Magrath sandstone.

References:

Russell, L. S. and Landes, R. W., 1940, Geology of the Southern Alberta Plains, Geol. Survey, Canada, Mem. 221, p. 75.

Russell, L. S., 1937, Del Bonita Area, Southern Alberta, Geol. Survey, Canada, Paper 37-10, p. 8.

KNEEHILLS TUFF: Top of Middle member, Edmonton formation, Upper Cretaceous

Author: Sanderson, J.O.G., 1945, in Allan, J.A., and Sanderson, J.O.G., Geology of Red Deer and Rosebud sheets, Alberta; Sc. and Industr. Research Council, Alberta, Rept. No. 13.

Locality: Named for outcrops along Kneehills Creek and its tributaries between Carbon and the Red Deer River.

History: The report containing the original description of Kneehills tuff was prepared in 1925 shortly after the tuff beds were discovered, but was not published until 1945.

Lithologic characteristics: Pale grey, hard massive rock of very fine grain resembling a rough-surfaced felsite or massive limestone; weathers to a much lighter shade than the unweathered rock.

Thickness and Distribution: Seldom thicker than 8 inches. Present on the Red Deer River in the vicinity of Drumheller and up Threehills Creek as far as Carbon. Also occurs in the Cypress Hills (Sanderson 1931) and on Oldman River near Macleod (Tozer 1952).

References:

Allan, J. A., 1925, Geology of Alberta Coal, Canadian Inst. Min. and Met., Bull. No. 156, April 1925, pp. 394, 395.

Sanderson, J.O.G., 1931, Volcanic Ash Beds in Alberta, Roy. Soc., Canada, Trans., Vol. 25, Ser. 3, Sec. IV, p. 65.

Tozer, E. T., 1952, The St. Mary River-Willow Creek Contact on Oldman River, Alberta, Geol. Surv., Canada, Paper 52-3.

KOOTENAY FORMATION: Upper Jurassic and Lower Cretaceous

Author: Dawson, G. M. (1886), Geol. and Nat. History Survey Canada, Annual Report. New Series, Vol. 1, Pt. B.

Locality: Kootenay Pass area. No specific type section designated.

History: Fox (1953) comments, "The Kootenay, as originally proposed by Dawson, includes the beds now referred to the Fernie formation, as well as the present Kootenay and the basal conglomerate of the Blairmore. Leach recognized that the black marine shales constituted a distinct unit, ..., naming them the Fernie formation. Rose observed an unconformity at the base of the chert conglomerate ... and he therefore removed the conglomerate upwards into the Blairmore formation, of which it now constitutes the basal unit. Thus the term Kootenay is now used in a considerably restricted sense."

Lithologic Characteristics: Fox (1953) summarized the literature on the lithology as follows: "The formation .... is composed of an uppermost bed of hard cherty conglomerate in a siliceous matrix, massive, moderately hard, dark coloured sandstone, thin bedded dark grey sandstones, grey, black, and carbonaceous shales and a number of coal seams .....

"The age of the Kootenay formation has been determined .... to be Lower Cretaceous with the possibility that some of the lower beds should be included in the Jurassic."

Crockford (1949) states: "The formation consists essentially of shale, siltstone, and conglomerate. Coal seams are present ....Rock types are gradational ..... . The shales are generally dark grey to black, crumbly to blocky, ..., and usually silty and sandy. ..... carbonaceous shales are common.... Coal seams, many of commercial thickness, occur at irregular intervals in the shales .... The siltstones are generally dark grey to black and grade into sandstone ..... The sandstones are .... fine grained to very coarse grained.... dark in colour due to a high content of black chert grains. The very coarse grained types are often quartzose..... Many ..... are thin bedded ..... Cross bedding is common, especially in the coarser types. ..... often contain impressions of branches."

Thickness and Distribution: Fox (1953) reports the thickness as being "Extremely variable; in Ribbon Creek area 3400 feet, at Canmore 3100 to 3300 feet, ..., 200 feet in Carbondale River area to 4000 feet in Fernie area." The Kootenay formation is confined to the foothills and mountains.

Relation to other Units: Underlain conformably by the Fernie formation and overlain unconformably by the basal Blairmore conglomerate.

References:

Axford, D. W. and Thompson, Ruth L. (1953), Notes on the Cretaceous of Southern Alberta, A.S.P.G. 3rd Ann. Field Conference Guide Book, pp. 36-37.

Berry, E. W. (1929), The Kootenay and Lower Blairmore Floras, Geol. Survey of Can., Mus. Bulletin 58, p. 28.

Crockford, M.B.B. (1949), Geology of Ribbon Creek Area, Alberta, Research Council of Alberta, Report No. 52, p. 30.

Fox, F. G. (1953), Glossary of Formation names of Southwestern Alberta, A.S.P.G. 3rd Annual Field Conference Guide Book, pp. 200-201.

Leach, W. W. (1912), Geology of the Blairmore Map Area, Alberta, Geol. Survey of Canada, Summ. Rept., 1911, pp. 194-195.

Rose, B. (1917), Crowsnest Coal Field, Alberta, Geol. Surv. Canada, Summary Report (1916) p. 110.

Prepared by: R. H. Erickson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

LABICHE FORMATION: Upper and Lower Cretaceous

Author: McConnell, R. G., 1893, Report on a Portion of the District of Athabaska, Geological Survey of Canada, Annual Report (New Series), Vol. 5, Part 1, 1890 - 91, p. 270.

Locality: The Valley of the Athabaska River from north of the Little Slave River to the Pelican River (Twp. 71, Rge. 1 W5 to Twp. 79, Rge. 17 W4).

Lithologic Characteristics: "Soft dark greyish or brownish shales . . . . usually coarsely laminated, very plastic. Contains nodules and small lenticular beds of limestone, numerous calcareous nodules, and occasionally thin beds of greyish and yellowish sandstone. Iron pyrites occur in . . . . . spherical crystalline aggregates scattered throughout the shales. . . . . About twenty-four miles below the mouth of the Lake La Biche River the shales have been baked and reddened for about 100 yards along their strike by the combustion of carbonaceous matter which they contain."

Thickness and Distribution: The upper 400 feet of the Labiche is exposed along the Athabaska River and its tributary streams south of Township 69. Wells in Township 66, Range 24 W4 indicate a thickness of 1380 feet (Feniak 1944).

Relation to other Units: Lies on Pelican sandstone (Lower Cretaceous) and is overlain by Belly River series (Upper Cretaceous). The base of the formation is believed to be Lower Cretaceous in age.

References:

Feniak, M., 1944, Athabaska - Barrhead Map Area, Geological Survey of Canada, Paper 44-6.

Prepared by: E. W. Jennings, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

LAKE LOUISE FORMATION: Lower Cambrian

Author: Walcott, C.D. (1908), Nomenclature of some Cambrian Cordilleran formations, Smithsonian Misc. Coll., Vol. 53, No. 1, p. 2-5.

Type Locality: "The Beehive" and Fairview Mountain near Lake Louise, Banff National Park, Alberta.

Lithologic Characteristics: "Compact, grey, siliceous shale" (Walcott, 1928) in the type area. Interbedded, variegated shales and sandstones (Deiss, 1939) in the Ptarmigan Peak-Redoubt Mountain area.

Thickness and Distribution: One hundred and five feet in the type section; thinner elsewhere. Restricted to the area near Lake Louise.

Relation to Other Units: A lenticular unit, considered by Walcott to separate the overlying St. Piran from the underlying Fort Mountain formation (both Lower Cambrian in age). Deiss (1939) designated the unit as a local member at the top of the Fort Mountain formation, but later (1940) suggested that the shale may not everywhere occur in the same stratigraphic position and, therefore, discarded the older, three-part terminology at least for the Mt. Assiniboine area. North and Henderson (1954) consider the Lake Louise "formation" to be a local shale lentil in the redefined St. Piran formation (includes both St. Piran and Fort Mountain of Walcott). The worm tubes, trilobite trails, and brachiopod and other fossil fragments give no exact correlations among the several areas or with any standard section.

References:

Deiss, Chas. (1939), Cambrian Formations of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Amer. Bull., Vol. 50, pp. 983-984, 986-987, 997.

Deiss, Chas. (1940), Lower and Middle Cambrian Stratigraphy of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Amer. Bull., Vol. 51, pp. 766-768.

Fox, F.G. (1953), Glossary of Formation Names of Southwestern Alberta, Alta. Soc. Petrol. Geol., 3rd Ann. Field Confer. & Symp., Guide Book, p. 186.

North, F.K. and Henderson, G.G.L. (1954), Summary of the Geology of the Southern Rocky Mountains, Alta. Soc. Petrol. Geol., 4th Annual Field Confer., Guide Book, p. 44.

Walcott, C.D. (1928), Cambrian Geology and Paleontology; No. 5: Pre-Devonian Paleozoic Formations of the Cordilleran Provinces of Canada, Smithsonian Misc. Coll. Vol. 75, No. 5, pp. 253-254, 281, 298, 303.

Prepared by: E. P. Williams, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

LEA PARK FORMATION: Upper Cretaceous

Author: Allan, J. A., 1918, Sections along North Saskatchewan River and Red Deer and South Saskatchewan Rivers between the Third and Fifth Meridians, Geological Survey of Canada Summary Report, 1917, Part C., p. 9c.

Locality: North Saskatchewan River between Fort Island and Battleford (twp. 55, Rge. 8 W4 M to Twp. 44, Rge. 16 W3 M.)

Lithologic Characteristics: "The formation consists of brownish and yellow shale at the top, underlain by dark grey marine shale in which many typical Lower Pierre fossils have been found."

Thickness and Distribution: Extends over central, east-central and northeastern Alberta. "Lowest strata in the section are exposed in the vicinity of Lea Park at the mouth of the Vermilion River, and belong to a horizon about 375 feet below the top of the Lea Park formation. The strata exposed along the river at Battleford belong to the upper portion of the Lea Park formation and are not as dark in color as those at the mouth of the Vermilion River." (Allan 1918) "The thickness ranges from 450 to 810 feet, thickening toward the northeast as a result of successive lensing out of members of the Belly River." (Shaw and Harding, 1954).

References:

Shaw, E. W., and Harding S.R.L., 1954, Lea Park and Belly River Formations of East Central Alberta, Western Canada Sedimentary Basin, Symposium A.A.P.G., pp. 297-308.

Prepared by: E. W. Jennings, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

LIVINGSTONE FORMATION: Rundle Group, Mississippian

Author: Douglas, R.J.W., 1953, Carboniferous Stratigraphy in the Southern Foothills of Alberta, A.S.P.G. Third Ann. Field Trip and Symposium, pp. 68, 78.

History: Douglas (p. 68) first uses the term for strata in the Mount Head Map-Area, "on ridges north of Flat Creek and Highwood River" (p. 75), and gives a very generalized description of the beds. He further indicates (p. 68) that his Livingstone formation of the Mt. Head Area is equivalent to his Rundle Member A, originally established in the Gap Area (Douglas, 1950, pp. 13-14). In 1950 Beales (pp. 59-64) published an excellent section of "Member A" from "the north bank of the headwaters of Flat Creek (NE¼ Sec. 6, Twp. 18, Rge. 5 W5 M.)" Since this locality lies within Douglas' type area, applies to the same beds as those designated by Douglas as "Livingstone", and remains the only published detailed section of that unit, it may be considered the type section, rather than the Livingstone Range from which the name is taken.

Lithologic Characteristics: Dominantly limestone, light grey, pale weathering, coarse to medium crystalline, crinoidal, topographically resistant, in thick massive units interbedded with thinner zones of finer and darker limestone, of dolomitic limestone and of dolomite, commonly brownish gray. Chert is scarce above the lower 500 feet, and sandstone is confined to the basal portion. Beales (1950) indicates (p. 39) that the Rundle (i.e. Livingstone)-Banff contact lies beneath the lowest "Rundle-type crinoidal limestone", but considers the Banff and Rundle to have a gradational relationship. The Mt. Head-Livingstone contact is emphasized by the marked topographic contrast between weak and prevailingly very dark, argillaceous and bituminous limestones above, and very resistant and massive, pale, crinoidal, prevailingly coarse-grained limestones below.

Thickness and Distribution: Type Area: Douglas 1005, Beales 1173; Gap Area 787; Banff Area 1482. The Livingstone comprises the lower and major portion of the Rundle group in the Southern Alberta mountains, is very prominent under the foothills belt, and thins eastward under the prairies as a result of post-Mississippian erosion.

Relation to other Units: The Livingstone rests everywhere on the Mississippian Banff formation, and is overlain by the Mississippian Mt. Head formation, except where the latter has been removed by post-Mississippian erosion. In the latter case, Mesozoic strata rest unconformably on the Livingstone. The relation of the Livingstone formation to H. H. Beach's unpublished but widely current term Dyson Creek is at present writing uncertain. The upper part of the Livingstone member at Tunnel Mountain yielded a late Osage Keokuk fauna (G.O.R.), and earlier Osage faunas (Warren, 1927, p. 29) have been reported from the lower part of the Rundle sequence.

References: (for "Member A")

Douglas, R.J.W., 1950, Callum Creek, Langford Creek and Gap Map-Areas, Alberta. Canada Geol. Surv., Memoir 255, pp. 12-17.

Beales, F. W., 1950, The Late Paleozoic Formations of Southwestern Alberta (Preliminary Account), Canada Geol. Surv., Paper 50-27, pp. 58-64.

Prepared by: Gilbert O. Raasch, Canadian Stratigraphic Service Ltd., Calgary, July 1954.

LLOYDMINSTER SHALE: Upper Cretaceous, (Now believed to be partially of Lower Cretaceous age at the base).

Author: Nauss, Arthur W., 1945, Cretaceous Stratigraphy of Vermilion Area, Alberta, Canada, American Association of Petroleum Geologists Bulletin, Vol. 29, No. 11, pp. 1615-1618.

Locality: The name is derived from the town of Lloydminster. The type locality is the Lloydminster gas well #2 in S.W. Sec. 12, Twp. 50, Rge. 28 W3, between the depths of 960 and 1690 feet.

Lithologic Characteristics: "The Lloydminster shale consists mainly of dark grey flaky marine shale with white calcareous specks, some lighter grey massive shale, and some sand lenses." "The upper 100-150 feet .... contains white specks .... lower speckled shale was not recognized in Lloydminster No. 2." The Viking gas sand is missing from this section in the Vermilion area. The lower-most beds are very bentonitic and Nauss suggests that they may be synchronous with the Crowsnest volcanics.

Thickness and Distribution: "The thickness of the Lloydminster shale varies from 690 to 800 feet in the Vermilion area. It thickens south and west; in southern Alberta it is overlain by the Milk River sandstone and is about 1500 feet thick".

Relation to other Units: The Lloydminster shale is underlain conformably by the Mannville formation and overlain conformably by the Lea Park shale. Nauss suggested a new name for this unit rather than using the term "Alberta Shale" because Hume (1930) defined the Alberta Shale as including all beds between the Blairmore and Belly River sands.

References:

Hume, G. S., 1930, The Highwood-Jumping Pound anticline, with Notes on Turner Valley, New Black Diamond and Priddis structures, Alberta, Canadian Geol. Survey Summ. Rept. 1929, Pt. B, pp. 1-24.

Prepared by: R. H. Erickson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

LONE MOUNTAIN FORMATION: Ronning Group, Upper Silurian.

Author: Kindle, E.M. & Bosworth, T.O., 1920, Oil Bearing Rocks of Lower MacKenzie River Valley, Can. Geol. Surv. Summ. Report Pt. B, p. 44.

Locality: Near the mouth of the North Nahanni River in the vicinity of the Great Bend of the MacKenzie River on Lone Mountain immediately south of the Nahanni.

History: Changed to North Nahanni River Dolomite by Kindle, 1936, and to include only the Upper Silurian.

Lithologic Characteristics: Light grey to almost black dolomite and magnesian limestone, finely crystalline, with 50 feet dark grey coralline limestone at the base.

Thickness and Distribution: 1800 feet thick at type section in the Discovery Range. 1600 feet thick in Wrigley-Cap Mountain Area to 530 feet thick in Mt. Charles Area on the Great Bear River halfway between the MacKenzie River and Great Bear Lake.

Relation to Other Units: Disconformably underlies the Devonian Bear Rock formation and overlies Mt. Kindle formation of Middle Silurian or Niagaran age. The upper Lone Mountain correlates with the Bear Rock of the Canol area and with an uncertain lower part of the Ramparts formation of the Rocky Mountains. The lower Lone Mountain is tentatively correlated with the Muncho and McConnell formations of the Rocky Mountains.

References:

Henderson, G.R.S., 1954, Stratigraphic Contribution: Northeastern British Columbia and Northwest Territories, A.S.P.G. Bull. Vol. 2, No. 7.

Kindle, E.M. 1936, Formation Names in the Mackenzie River Valley, Science, Vol. 83, No. 2140, pp. 14-15.

Williams, M.Y., 1922, Reconnaissance across Northeastern British Columbia and the Geology of the Northern Extension of the Franklin Mountains, N.W.T., Can. Geol. Sur. Sum. Rept., Pt. B.

Hume, G.S., and Link, T.A., 1945, Canol Geological Investigations in the MacKenzie River Area, N.W.T. and Yukon, Geol. Sur. Can. Paper 45-16, pp. 11-16.

Prepared by: Canada-Cities Service Petroleum Corp., Calgary, August 1954.

LOOMA MEMBER: Grand Rapids formation, Mannville group, Lower Cretaceous

Author: Badgley, C. Peter, 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta. Geological Survey of Canada, paper 52-11, p. 6.

Locality: Imperial Looma No. 1 Well, in Lsd. 4, Sec. 10, Twp. 50, Rge. 23 W4, Alberta, depths 3716-3740.

Lithologic Characteristics: A thin laterally persistent unit consisting of interbedded soft dirty coal, carbonaceous shale, and occasional greywacke beds.

Relation to other Units: Badgley does not correlate the Looma member with any other unit.

Prepared by: J. S. Crewson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

LOON RIVER SHALE: Fort St. John Group, Lower Cretaceous

Author: McLearn, F. H., 1918, Peace River Section, Alberta, Geological Survey of Canada Summary Report, 1917, Part C, p. 15c.

Locality: Peace River, from Vermilion Chutes to Brown's Trading Post, north and east of the great Horseshoe Bend. (Twp. 108, Rge. 6, W5 to Twp. 116, Rge. 13 W4 M).

Lithologic Characteristics: Dark blue to grey friable-weathering shale with few rounded or flattened ironstone concretions. South of type locality the beds become more arenaceous.

History: A study group of the Alberta Society of Petroleum Geologists (1954), following Badgley's nomeclature (1952, p. 9), has deleted the name Loon River in the Peace River Area, dividing it into the Falher and Wilrich members of the Spirit River formation.

Thickness and Distribution: The unit increases in thickness from 400 feet plus at the Horseshoe Bend to 1100 feet in wells to the south of the type area.

Relation to other Units: Rests on McMurray sands (Lower Cretaceous) in the Peace River area or Bullhead sandstone (Lower Cretaceous) in the Fort St. John area, and is overlain by the Peace River formation (Lower Cretaceous).

References:

Alberta Study Group, 1954, Western Canada Sedimentary Basin, Symposium A.A.P.G., pp. 268-278.

Badgley, P. C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geological Survey of Canada, Paper 52-11.

Prepared by: E. W. Jennings, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

LUSCAR FORMATION: Lower Cretaceous

Author: MacKay, R.B., 1929, Brule Mines Coal Area, Alberta, Geol. Sur., Canada, Sum. Rept. 1929, Pt. B., pp. 12-14.

Locality: Mountain Park and Luscar Coal basins; no areal limit postulated.

Lithologic Characteristics: In the Pierre Gray Lakes region north of Jasper Park typical Luscar consists of fine-to medium-grained, grey and brown, buff, brown, and grey weathering sandstone; grey, greenish grey and black shale; and thin yellow-weathering ironstone bands generally associated with shale; conglomerate is scarce (Irish 1951). East of the Park, in the Brule-Entrance and Mountain Park-Luscar areas, it is a succession of dark grey sandy shales, black carbonaceous shales, grey and greenish grey sandstones, with a few thin beds and lenses of fine conglomerate, containing the commercial coal seams of the area reportedly as much as 30 feet thick, shale constituting about 60% of the formation (MacKay 1928, Lang 1947 and McLearn 1945). The coal seams are reported as being in the upper part of the Luscar in the Alexo-Saunders area southeast of Jasper Park (Erdman, 1950). The coal mined at Nordegg is in the Luscar.

Thickness: Thickness of both Luscar and overlying Mountain Park in Pierre Grays Lakes and Brule-Entrance areas estimated as 2000 feet; in Luscar-Mountain Park area Luscar is 1600 feet, with 390 feet Mountain Park formation above, thus suggesting same thickness Luscar in the areas of the northwest. In Alexo-Saunders area Luscar estimated to be 850-1175 feet thick.

Relation to Other Units: Conformably overlies the Cadomin conglomerate and conformably overlain by Mountain Park formation, Gammell (1955) shows Luscar equivalent to all the Blairmore of the plains subsurface.

Paleontology: Fossil plants collected in the Brule area indicate Aptian age (Lang, 1947), equivalent to lower part of Blairmore.

References:

Erdman, O.A., 1950, Alexo and Saunders Map-Areas, Alberta, Geol. Sur., Canada, Memoir 254, p. 12.

Gammell, H.G., 1955, The Viking Member in Central Alberta, Jour. Alberta Soc. Petrol. Geol., Vol. 3, No. 5, p. 67.

Irish, E.J.W., 1951, Pierre Grays Lakes Map-Area, Alberta, Geol. Sur., Canada, Memoir 258, pp. 18-22.

Lang, A.H., 1947, Brule and Entrance Map-Areas, Alberta, Geol. Sur., Canada, Memoir 244, pp. 24-26.

MacKay, R.B., 1930, Stratigraphy and Structure of Bituminous Coal Fields in the Vicinity of Jasper Park, Alberta, Trans. Can. Inst. Min. & Met., Vol. 33, pp. 473-509.

Prepared by: L.E. Workman, Canadian Stratigraphic Service Ltd., Calgary, August, 1955.

[redacted]

McCONNELL FORMATION: Lower Devonian

Author: Leudon L. R. and Chronic B. J. Jr., 1949, Paleozoic Stratigraphy along the Alaska Highway in Northeastern British Columbia, A.A.P.G. Bulletin, Volume 33, No. 2, pp. 189-222.

Locality: In the Sentinel Mountain Range east of mile 472 on the Alaska Highway, on a secondary peak west of Mt. McConnell.

Lithologic Characteristics: Alternating grey massive fine grained limestones and dark grey to black shaly limestone, with a thin section of grey, tan, fine grained siltstone and black shale at the top of the formation.

Thickness and Distribution: The McConnell formation with an approximate thickness of 680 feet is found generally between miles 390 and 443 along the Alaska Highway.

Relation to other Units: Rests unconformably on the Monning formation, and is overlain unconformably by the Muncho formation.

[redacted]:

McLean, F. H. and Kindle, E. D., 1950, Geology of Northeastern British Columbia, Geological Survey of Canada, Memoir No. 259, pages 24, 26, 28.

Leudon, L. R. and Chronic, B. J. Jr., 1947, Mississippian Rocks of Meramec Age along the Alcan Highway of Northern British Columbia, A.A.P.G. Volume 31, No. 9, p. 1613.

Prepared by: Canada-Cities Service Petroleum Corporation, Calgary, June 1954.

MAGRATH SANDSTONE: Bearpaw formation, Upper Cretaceous

Author: Link, T. A. & Childerhose, A. J., 1931, Bearpaw Shale and Contiguous Formations in Lethbridge, Alberta, Amer. Assoc. Petrol. Geol. Bull. Vol. 15, No. 10, pp. 1227-1241.

Locality: South bank of St. Mary River, one-half mile downstream from the Magrath Coulee on the northern edge of Twp. 6, Rge. 22 W4 M.

Lithologic Characteristics: A sandy zone consisting of several members, locally coarse grained, and with a light greenish color which distinguishes it from the over-and underlying grey shales. It contains fossiliferous (Artica ovata) concretions.

Thickness and Distribution: 62 feet thick at the type section, and considered a local unit when named. A sandy Artica ovata zone in the same stratigraphic position is present in the Manyberries area, 100 miles to the east.

Relation to other Units: Top lies about 250 feet above the base of the Bearpaw formation and about 100 feet below the Kipp sandstone.

References:

Russel, L. S. and Landes, R. W., 1940, Geology of the Southern Alberta Plains, Geol. Survey Can. Mem. 221, p. 74.

Russel, L. S., 1937, Del Bonita Area, Southern Alberta, Geol. Survey Canada, Paper 37-10, p. 8.

Prepared by: J. T. Humphreys, Calgary, July 1954.

MANNVILLE FORMATION: Lower Cretaceous

Author: Nauss, Arthur W., 1954, Cretaceous Stratigraphy of Vermilion Area, Alberta, Canada, American Association of Petroleum Geologists Bulletin, Vol. 29, No. 11, pp. 1605-1629.

Locality: Northwest Mannville well #1, Lsd. 1, Sec. 18, Twp. 50, Rge. 8 W4, between depths 1833 and 2308.

Lithologic Characteristics: Interbedded "salt and pepper" sands, non-marine grey shale, quartz sand, coal seams, and a marine shale member.

Thickness and Distribution: 455' in type well and is distributed through Nauss's Vermilion area, Twp. 43 to 57, Rge. 1 to 14, W4. Badgley (1952) used Mannville in an area between Edmonton, Athabaska and Lloydminster, Alberta.

Relation to other Units: Rests unconformably on Devonian rocks. Overlain by Lloydminster shale. Badgley (1952) tentatively gives Mannville the rank of a group.

References:

Badgley, Peter C., (1952), Notes on the Subsurface Stratigraphy and Oil and Gas Possibilities in Central Alberta, Geol. Survey of Canada, Preliminary Paper 52-11, p. 4.

Prepared by: R. H. Erickson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

MEDICINE HAT GAS SAND: Colorado Group, Upper Cretaceous.

Author: Local usage.

Locality: Medicine Hat and vicinity.

History: "In 1890 a well drilled at Medicine Hat in search of coal, encountered a considerable supply of natural gas, the flow being so strong as to lead town officials to take the matter up with the Canadian Pacific Railway, with a view to drilling a deeper well for gas. Sir William Van Horn offered to lend the town a drilling machine, the town to stand the expense of the drilling. A considerable flow of gas was encountered at about 650 feet in depth, with a closed pressure of 250 pounds, but was accompanied by a large amount of moisture. In the hope of obtaining a larger supply free from moisture, deeper wells were drilled and the present gas pay was developed in a well drilled by the city at a depth of 1010 feet showing a closed pressure of 550 pounds."

The gas sand at 1010 in the Main Street, or No. 1 well is referred to as "Medicine Hat gas sand".

Thickness and Distribution: 0 to 45 feet thick. Probably does not extend far from the immediate vicinity of Medicine Hat.

Relation to Other Units: Top occurs 80 to 100 feet below the top of the Colorado as marked by the top of the first occurrence of speckled shale. Probably a stratigraphic trap by shaling in eastern portions.

References:

Alberta Petroleum and Natural Gas Conservation Board, Schedule of Wells, 1944, pp. 80-81.

Slipper, S.E., 1935, Geology of Natural Gas, Amer. Assn. Petrol. Geol., pp. 36-39.

Russell, L.S. and Landes, R.W., 1940, Geology of the Southern Alberta Plains, Geol. Sur. Canada, Mem. 221, pp. 25, 121-122.

Williams, M.Y. and Dyer, W.S., 1930, Geology of Southern Alberta and Southwestern Saskatchewan, Geol. Sur. Canada, Mem. 163, pp. 116-120.

Prepared by: G.B. Choquette, Canadian Stratigraphic Service Limited, Calgary, August 1954.

MILK RIVER FORMATION: Montana group, Upper Cretaceous

Author: Dawson, G.M., 1875, "Report of the Geology and Resources of the Region in the Vicinity of the Forty-ninth Parallel from the Lake of the Woods to the Rocky Mountains", 379 pp., Montreal, pp. 118-121.

Locality: Upper Milk River: Deadhorse Coulee, Sec. 32, Twp. 1, Rge. 11 W. 4th Mer.

Lithologic Characteristics: The Milk River formation can be divided into Upper and Lower members. The top of the Upper Milk River is marked by a concentration of chert pebbles at the base of the overlying Pakowki formation. The upper member consists chiefly of fine-grained, grey, argillaceous sandstones with some interbedding of sandy clays and grey micromicaceous shales. Thin streaks of impure lignite and bands or inclusions of ironstone are common. The lower member consists chiefly of light grey medium-grained cherty massive sandstone with occasional thin streaks of sandy shale. A variable thickness of sandy shale and shaly sandstone mark a transitional zone which grades downward to the Colorado shale, the base being marked at the first occurrence of white speckled shale in the top of the Colorado.

Thickness and Distribution: 0 to 300 feet, being greatest near the International Boundary. Outcrops in southern Alberta along Red Creek west and north of Coutts, in Verdigris Coulee from 1/2 mile below Verdigris Lake to the junction with Milk River Valley, and in the valley of Milk River and its tributaries from Red Creek east to a point 2 miles below the mouth of Deadhorse Coulee. In the subsurface, varies from 40 feet at Medicine Hat to 270 feet at Red Coulee. It is 88 feet at Lethbridge, 100 feet at Woodpile Coulee, 150 feet at Foremost, 200 feet at Pakowki Lake. Does not extend far north of Brooks.

Relation to Other Units: Rests on the dark grey calcareous shale of the Colorado group and is overlain by the grey micromicaceous shale of the Pakowki formation. The Highwood sandstone of the Wapiabi formation is considered to be the stratigraphic equivalent. It is known as the Eagle formation in Montana. The lower part is known as the Virgelle sandstone. The Milk River and Pakowki together are equivalent to the Lea Park formation north of about township 9.

References:

Evans, C.S., 1930, Geol. Surv. of Canada, Summary Report, 1930, pt. B, pp. 15, 16.

Russell and Landes, 1940, Geology of the Southern Alberta Plains, Geol. Sur. of Canada, Memoir 221, pp. 27-34.

Williams, M.Y., and Dyer, W.S., 1930, Geology of Southern Alberta and Southwestern Saskatchewan, Memoir 163, pp. 13-14.

Prepared by: C.K. Fisher, Canadian Stratigraphic Service Ltd., Calgary, August, 1954.

MINNEWANKA FORMATION: Upper Devonian

Author: Shimer, H. W., 1926, Upper Paleozoic Faunas of the Lake Minnewanka Section, near Banff, Alberta, Can. Geol. Sur., Bull. 42, Series No. 45, pp. 1-24.

Locality: Devils Gap, northwestern shore of Lake Minnewanka, in the southern termination of the Palliser range, near Banff.

History: G. M. Dawson (1886) referred to a series of limestone in Banff area as Carboniferous and Devonian. D. B. Dowling (1907) divided the series into Upper Banff limestone, Lower Banff shale, Lower Banff limestone as Carboniferous, Intermediate limestone as Devonian. E. M. Kindle (1924) gave the following succession of Dawsons beds:

Rundle limestone (Upper Banff limestone .... Pennsylvanian)
Banff shale (Lower Banff shale .... Mississippian)
Banff limestone & dolomite (Lower Banff limestone)
(Intermediate limestone) .... Devonian

H. W. Shimer (1926) gave the name Minnewanka formation to the Lower Banff limestone and Intermediate limestone. F. G. Fox (1951) elevated the Minnewanka formation to group status and included in it the Palliser and Fairholme formations.

Lithologic Characteristics: Light grey limestone and dolomite, massive to more thinly bedded in upper part. Alternating fine to coarse-grained dolomite and limestone in lower part. Fossiliferous.

Thickness and Distribution: 2500' at type locality.

Relation to other Units: Rests disconformably upon the Ghost River formation and overlain by calcareous grey to black shales of the Banff formation (Mississippian).

References:

Warren, P. S., 1927, Banff Area, Alberta, Geol. Sur. Mem. 153, pp. 13-21.
Fox, F. G., 1951, Devonian Stratigraphy of Rocky Mountains and Foothills between Crowsnest Pass and Athabaska River, Alberta, Canada, Bull. Amer. Assoc. Petrol. Geol., Vol. 35, No. 4, pp. 822-843.

Prepared by: R. A. Reed, Shell Oil Company, Calgary, July 1954.

MORRISON FORMATION: Upper Jurassic

Author: Weir, J. D., 1949, Marine Jurassic Formations of Southern Alberta Plains, American Association of Petroleum Geologists Bull., Vol. 33, No. 4, pp. 547, 561-563.

Locality: The Morrison formation was named by G. H. Eldridge, 1896, U.S.G.S. Mon. 27, from the town in Colorado, U.S.A., near which it is typically developed.

Thickness and Distribution: No outcrops of Jurassic age occur in the Southern Alberta plains region and our knowledge of the stratigraphy of this age is based only on information gained from the study of deep well sample cuttings. It is probable that the retreat of Jurassic marine waters from Southern Alberta was followed by some continental Jurassic (Morrison) deposition as in Montana, but it is believed that all the Morrison formation was removed from Southern Alberta plains by post-Morrison - pre-Blairmore erosion.

References:

Frebold, Hans, 1953, Correlation of the Jurassic Formations of Canada, Bulletin of the Geological Society of America, Vo. 64, pp. 1229-1246.

Lexicon of Geologic Names of the United States, Part 2, M-Z, Geological Survey Bulletin 896, pp. 1423-1424.

Prepared by: Sun Oil Company, Calgary, July 1954.

MORRO MEMBER: Palliser formation, Upper Devonian

Author: R. de Wit and D. J. McLaren, 1950, Devonian Sections in the Rocky Mountains between Crows Nest Pass and Jasper, Alberta, Geological Survey of Canada, Paper 50-23, page 6.

Locality: Front ranges of the Rocky Mountains near the Bow River, Alberta. A representative section is exposed at the Crows Nest Pass, Alberta.

Lithologic Characteristics: Dark grey to brownish grey, dense, hard, thick bedded to massive, but occasionally small intervals may be thin bedded, cliff-forming limestones, which may be partially or almost completely dolomitized, the dolomitized portions often forming an ideographic tracery on weathered surfaces.

Thickness and Distribution: At the Devils Gap, Lake Minnewanka, which is in the type area, the thickness is 723 feet. Elsewhere the thickness ranges from 229 feet at the Clearwater River (de Wit and McLaren, ibid, pp. 46-47) to approximately 1300 feet in the Sunwapta Pass area (Severson, 1950). The Morro is present throughout the Rocky Mountains where Upper Devonian rocks occur.

Relation to other Units: Rests on the silty Alexo formation (Upper Devonian) and is overlain by the thin bedded dolostones of the Costigan member of the Palliser formation. It is the equivalent of the lower part of the Wabamun which is widespread in the Plains Area of Alberta.

References:

Severson, J. L., 1950, Devonian Stratigraphy, Sunwapta Pass Area, Alberta, Canada, Amer. Assoc. Pet. Geol. Bull., Vol. 34, No. 9, pp. 1826-1850.

Fox, F. G., 1951, Devonian Stratigraphy of Rocky Mountains and Foothills between Crows Nest Pass and Athabaska River, Alberta, Canada, Amer. Assoc. Pet. Geol. Bull., Vol. 35, No. 4, pp. 822-843.

Beales, F. W., 1953, Dolomitic Mottling in Palliser (Devonian) Limestone, Banff and Jasper National Parks, Alberta, Amer. Assoc. Pet. Geol. Bull., Vol. 37, No. 10, pp. 2281-2293.

Prepared by: P. W. Taylor, Shell Oil Company, Calgary, July 1954.

MOUNTAIN PARK FORMATION: Lower Cretaceous.

Author: MacKay, R.B., 1930, Stratigraphy and Structure of Bituminous Coal-fields in the Vicinity of Jasper Park, Alberta, Trans. Can. Inst. Min. & Met., Vol. 33, p. 477.

Locality: Mountain Park and Luscar coal basins; no areal limit postulated.

Lithologic Characteristics: In the Alexo and Saunders map-area east of Jasper Park consists of thin-and thick-bedded, gritty sandstone, weathering grey and green, interbedded with grey shales; conglomerate occurs within the formation and a persistent pebble-cobble band of variable thickness marks the upper contact (Erdman 1950). In the Brazeau area southeast of the Park described as olive green and brown sandy shale and sandstone that weathers grey (MacKay 1941).

Thickness: 650 feet thick in Brazeau map-area and 700-750 feet in Saunders map-area to east. Probably undetermined thickness of upper part of "Luscar" in Brule-Entrance and Pierre Grays Lakes areas to northwest.

Relation to Other Units: Conformably overlies Luscar formation and conformably overlain by Blackstone formation. Gammell (1955) shows Mountain Park equivalent to sediments included between base Fish Scale sandstone and base Joli Fou shale.

References:

Erdman, O.A., 1950, Alexo and Saunders Map-Areas, Alberta, Geol. Sur. Can., Memoir 254, p. 12.

Gammell, H.G., 1955, The Viking Member in Central Alberta, Jour. Alberta Soc. Petrol. Geol., Vol. 3, No. 5, p. 67.

Irish, E.J.W., 1951, Pierre Grays Lakes Map-Areas, Alberta, Geol. Sur. Canada, Memoir 258, pp. 18-22.

Lang, A.H., 1947, Brule and Entrance Map-Areas, Alberta, Geol. Sur. Canada, Memoir 244, pp. 24-26.

MacKay, R.B., 1941, Preliminary Map Brazeau, Alberta, Geol. Sur. Canada, Paper 41-4.

Prepared by: L.E. Workman, Canadian Stratigraphic Service, Calgary, August 1955.

MOUNT CLARK FORMATION: Lower Cambrian

Author: Williams, M. Y., 1923, Reconnaissance across N.E. British Columbia and Geology of Northern Extension of Franklin Mountains, N.W.T., G.S.C. Summ. Rept. 1922, Part B, pp. 65-87.

Locality: Mount Clark, Franklin Mountains, Northwest Territories.

Lithologic Characteristics: Mainly pink and white quartzites containing Scolithus. Ferruginous conglomerates, grits and micaceous shales occur in lower part. Green shales with Salterella and Olenellus canadensis Walcott, and arkosic grits form uppermost part.

Thickness and Distribution: 620 feet or more exposed on eastern side of Cap Mountain, Franklin Mountains, N.W.T. More than 500 feet on top of Mount Clark.

Relation to other Units: Rest disconformably on dark shales of Precambrian (?) age and is overlain conformably by grey shales and sandstones of Mount Cap formation (Middle Cambrian).

References:

Williams, M. Y., 1922, Exploration east of Mackenzie River, between Simpson and Wrigley, G.S.C., Summ. Rept. 1921, Part B, pp. 56-66.

Williams, M. Y., 1924, Franklin Mountains, Bull. Geol. Soc. Am., Vol. 35, pp. 449-464.

Prepared by: J.C.H. Albrecht, Shell Oil Company, Calgary, June 1954.

MOUNT HAWK FORMATION: Fairholme group, Upper Devonian

Author: deWit, R. and McLaren, D. J., 1950, Devonian Sections in the Rocky Mountains between Crowsnest Pass and Jasper, Alberta, Geological Survey of Canada, Paper 50-23.

Locality: Roche Miette, Jasper National Park, Alberta; on south side of Edmonton-Jasper Highway about 6 miles from park gates, immediately west of the turn-off to Miette Hotsprings.

Lithologic Characteristics: Dark grey limestones, silty and argillaceous, in beds rhythmically intercalated with thin argillaceous partings. In some places massive limestone and dolomite beds are present in the upper part of the formation.

Thickness and Distribution: 220-475 feet, thickening generally from west to east in the Rocky Mountains. Extends as far south as the North Ram River in the mountains and as far south as Clearwater River in the foothills. North of the Athabaska River area its extent is unknown.

Relation to other Units: Transitional from the shales of the underlying Perdrix formation (Upper Devonian), from which it is separated by being more calcareous. Overlain by the silty limestones of the Alexo formation (Upper Devonian) from which it is distinguished by the increased silt content of the Alexo. Correlated with Upper member of the Fairholme formation of the Banff area.

References:

Fox, F. G., 1951, Devonian Stratigraphy of Rocky Mountains and Foothills between Crowsnest Pass and Athabaska River, Alberta, Canada, Amer. Assoc. Petrol. Geol. Bull., Vol. 35, No. 4, pp. 822-843.

Warren, P. S. and Stelck, C. R., 1950, Succession of Devonian Faunas in Western Canada, Trans. Roy. Soc. Can., Vol. XLIV, ser. III, section 4, pp. 61-78.

Prepared by: F. H. Trollope, Socony-Vacuum Exploration Company, Calgary, July 1954.

MT. HEAD FORMATION: Rundle Group, Mississippian

Author: Douglas, R.J.W., 1953, Carboniferous Stratigraphy in the Southern Foothills of Alberta, A.S.P.G. Third Ann. Field Trip and Symposium, pp. 68, 75-78.

History: F. W. Beales (1950) published a detailed description of the section at Mt. Head, and used Douglas' 1950 terms Member B and Member C for the unit subsequently designated as Mt. Head by Douglas (1953). Douglas himself (1953, p. 68) correlates his Members B and C of the Gap area with his Mt. Head Formation of the Mt. Head Area.

Lithologic Characteristics: Upper portion ("Member C"): mainly dark gray to black limestone, fine grained, brittle, breaking with conchoidal fracture, interbedded with thinner units of black calcareous shale; upper 30 feet coarser, more resistant, medium-grained calcarenitic limestone. Lower portion ("Member B"): limestone, dolomite, and dolomitic limestone thickly interbedded, brown to dark and light gray, dense calcilutitic to very coarsely calcarenitic; weaker and more resistant units alternate. Cherty beds decidedly in the minority except near base.

Thickness and Distribution: Type area, 695 (Douglas), 565 (Beales); Gap area, 680; Highwood Pass 556; Banff Area 542. A readily recognizable unit throughout the Southern Alberta mountains; largely absent beneath the plains and foothills as a result of post-Mississippian erosion.

Relation to other Units: Overlain by Etherington member of Rocky Mountain Formation, except where overlapped by Mesozoic strata. Underlain by Livingstone Formation, Rundle Group, Mississippian. The relation to H.H. Beach's unpublished term Shunda is at present writing uncertain. On faunal evidence from Highwood Pass and Tunnel Mountain, a Meramecian age is indicated (G.O.R.)

References:

Douglas, R.J.W., 1950, Callum Creek, Langford Creek and Gap Map-Areas, Alberta, Canada Geol. Surv., Memoir 255, pp. 12-17.

Beales, F. W., 1950, The Late Paleozoic Formations of Southwestern Alberta (Preliminary Account), Canada, Geol. Surv., Paper 50-27, pp. 48-58.

Prepared by: Gilbert O. Raasch, Canadian Stratigraphic Service, Ltd., Calgary, July 1954.

MOUNT WHYTE FORMATION: Lower and Middle Cambrian of the Rocky Mountains in the vicinity of Kicking Horse Pass, Alberta and British Columbia.

Author: Walcott, C.D. (1908), Nomenclature of Some Cambrian Cordilleran Formations, Smithsonian Misc. Coll., Vol. 53, No. 1, pp. 2-4.

Type Locality: North Slope of Mt. Whyte in the Bow Range two miles west of the outlet of Lake Louise, Banff National Park, Alberta. Emended by Deiss (1939) to Ptarmigan Peak, 10 miles northeast of the original type locality, and by Rasetti (1951) to the east slope of Popes Peak, about 1 mile south of the original type locality.

Lithologic Characteristics: Deiss (1939, pp. 998-1000) states that the original description is not applicable and that his amended type section consists of:

(1) Upper 143-foot member: interbedded colitic limestones and shales.

(2) Middle 106-foot member: green shales with thin sandstones and conglomerates, grading upward into shaly calcareous sandstones and finally into blue-grey nodular impure limestones.

(3) Basal 26-foot member: flaggy beds of limestone and arenaceous limestone, with lenticular beds of pebbly sandstone, and shale partings.

The basal member contains the Olenellus fauna, and the upper member, the Plagiura zone, both Lower Cambrian, according to Deiss (1939) but, according to Rasetti (1951), Lower and Middle Cambrian, respectively.

Thickness and Distribution: Deiss (1939) describes 275 feet in his emended type section. Rasetti (1951) measured 211 feet in his type section but did not include the basal 20-foot Peyto limestone in the formation. Other thicknesses by Rasetti vary from 58 to 578 feet. The formation is known at numerous localities in the vicinity of the Kicking Horse Pass, and may be widely distributed.

Relation to Other Units: Overlies the Lower Cambrian St. Piran formation and is overlain by the Middle Cambrian Cathedral formation. The contacts are apparently conformable in the separate areas described. There may be a marked disconformity between the basal Olenellus zone and the remainder of the formation.

References:

Allan, J.A. (1914), Geology of Field Map-area, B.C. and Alberta, Canada, Geol. Survey, Mem. 55, pp. 63, 64, 66.

Burling, L.D. (1916), The Albertella Fauna Located in the Middle Cambrian of British Columbia and Alberta, Amer. Jour. Sci., 4th Ser., Vol. 42, pp. 469-472.

Burling, L.D. (1922), A Cambrian-Ordovician section in the Beaverfoot Range, near Golden, British Columbia, Geol. Mag., Vol. 59, pp. 459-460.

Deiss, Chas. (1939), Cambrian Formations of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Amer. Bull., Vol. 50, pp. 970-973, 980-982, 986-987, 990-993, 998-1000, 1012-1015, 1018-1019.

.....2

Deiss, Chas. (1940), Lower and Middle Cambrian Stratigraphy of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Amer. Bull., Vol. 51, pp. 749, 752, 766, 781-783.

Fox, F. G. (1953), Glossary of Formation Names of Southwestern Alberta, Alta. Soc. Petrol. Geol., 3rd Annual Field Conf. and Symp., Guide Book, p. 187.

North, F.K. and Henderson, G.G.L. (1954), Summary of the Geology of the Southern Rocky Mountains of Canada, Alta. Soc. Petrol. Geol., 4th Annual Field Confer., Guide Book, p. 53.

Rasetti, F. (1951), Middle Cambrian Stratigraphy and Faunas of the Canadian Rocky Mountains, Smithsonian Misc. Coll., Vol. 116, No. 5, pp. 13-53, 56-64, 84-87.

Walcott, C.D. (1917), Fauna of the Mt. Whyte formation, Smithsonian Misc. Coll., Vol. 67, No. 3, pp. 61-114, pls. 8-13, figs. 1-3.

Walcott, C. D. (1928), Cambrian Geology and Paleontology, No. 5: Pre-Devonian Paleozoic formations of the Cordilleran Provinces of Canada, Smithsonian Misc. Coll., Vol. 75, No. 5, pp. 251-252, 302.

Prepared by: E. P. Williams, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

MULGA TONGUE: Lea Park formation, Upper Cretaceous

Author: Nauss, Arthur W. (1945), Cretaceous Stratigraphy of Vermilion Area, Alberta, Canada, Amer. Assoc. Petrol. Geol. Bulletin, Vol. 29, No. 11, pp. 1605-1629.

Locality: The type section is given as Imperial Oil Core Test #44, Lsd. 13, Sec. 14, Twp. 49, Rge. 9 W4.

Lithologic Characteristics: The tongue consists of massive dark grey shale with fine silt lenses and without plant remains.

Thickness and Distribution: Twenty to forty feet thick. The distribution is in Vermilion area, Twp. 43 to 57, Rge. 1 to 14 West Fourth Meridian.

Relation to other Units: "The Mulga tongue is underlain by medium grained lower Birch Lake sand and is overlain by medium grained upper Birch Lake sand. Its lower contact is sharp whereas the upper contact is gradational, ..." "The Mulga tongue may be the correlative of the Shandro shale on the North Saskatchewan River (Allan, 1918) and the shale at the base of the sand on Birch Lake."

References:

Allan, J. A. (1918), Sections along North Saskatchewan River, and Red Deer and South Saskatchewan River, Canada Geological Survey Summary Report. 1917, Pt. C., pp. 9-13, Fig. 2, map.

Prepared by: R. H. Erickson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

MUNCHO FORMATION: Lower Devonian or Upper Silurian

Author: Leudon, L. R. and Chronic, B. J., Jr., 1949, Paleozoic Stratigraphy along Alaska Highway in Northeastern British Columbia, Bull. Amer. Assoc. Petrol. Geol., Vol. 33, No. 2, pp. 189-222.

Locality: Type section of the Muncho formation is located in the Sentinel Range on a secondary peak west of Mt. McConnell east of Mile 472 on the Alaska Highway in north-central British Columbia.

Lithologic Characteristics: Grey and black shaly, silty, hard, laminated, limestone and massive limestone with a thin conglomerate at the base in places.

Thickness and Distribution: 50' to 600' along the Alaska Highway in north-central British Columbia.

Relation to other Units: Rests disconformably on grey and black limestones of the McConnell (Lower Devonian or Upper Silurian) formation and is disconformably overlain by the siltstones and sandy limestones of the Ramparts (Devonian) formation. Tentatively correlated by Henderson (A.S.P.G. News Bull., (Vol. 2, No. 7, 1954) with an uncertain part of the Cathedral Mountain section of Kingston (Bull. Amer. Assoc. Petrol. Geol. (Vol. 35, No. 11, 1951), with the lower part of the Lone Mountain formation of the Northwest Territories, and with the disconformity at the base of the Bear Rock formation and beds above Mount Kindle equivalent of the Ronning group in the Canol region.

References:

McLean, F. H. and Kindle, E. D., 1950, Geology of Northeastern British Columbia, Geol. Surv. of Canada, Memoir 259, pp. 24, 26, 28.

Leudon, L. R. and Chronic, B. J., Jr., 1947, Mississippian Rock of Meramec Age along the Alcan Highway of Northern British Columbia, Bull. Amer. Assoc. Petrol. Geol., Vol. 31, No. 9, p. 1613.

Prepared by: Canada-Cities Service Petroleum Corporation, Calgary.

MYRTLE CREEK FORMATION: Belly River formation, Upper Cretaceous

Author: Allan, J. A. (1918) Sections along North Saskatchewan River and Red Deer and South Saskatchewan, Canada Geological Survey Summary Report, 1917, pt. C., p. 12, and fig. 2.

Locality: " . . . . well exposed at the mouth of Myrtle Creek," in Twp. 58, Rge. 20 W4.

Lithologic Characteristics: "This formation includes clayey sandstones irregularly hardened, arenaceous shales, shales, bluish and brownish ironstone nodules, and thin coal seams and coaly shales near the top." Fresh water origin.

Thickness and Distribution: "The thickness of the formation is at least 425 feet." Allan did not assign an area distribution but he mapped the Myrtle Creek for 18 miles along the North Saskatchewan River in the area of the type locality.

Relation to other Units: " . . . . corresponds to the Pale beds in Mr. Slipper's classification." Overlain by the Bearpaw formation and underlain by the Pakan formation.

References:

Shaw, E. W. and Harding, S.R.L. (1954) Lea Park and Belly River Formations of East-Central Alberta. Western Canada Sedimentary Basin, Amer. Assoc. Petrol. Geol. Symposium, pp. 297-308.

Hauss, A. W. (1945) Cretaceous Stratigraphy of Vermilion Area, Alberta, Canada, Bulletin A.A.P.G., Vol. 29, pp. 1605-29.

Slipper, S. E. (1918) Viking Gas Field, Central Alberta, Geol. Survey Canada Summ. Rept., 1917, pt. C., pp. 9-13.

Prepared by: R. H. Erickson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

NOTIKEWIN MEMBER: Spirit River formation, Lower Cretaceous, in Peace River region.

Author: Alberta Study Group, 1954, Lower Cretaceous of the Peace River Region, Western Canada Sedimentary Basin, Amer. Assn., Pet. Geol., Tulsa, pp. 274-275.

Locality: West-Central Alberta in the vicinity of Peace River, in an area from the British Columbia - Alberta boundary eastward to the west end of Lesser Slave Lake, and in a north-south direction from Twp. 71 to 96. Type section is Wickenden's (1951) Section 8 (pp. 28-30), located in southeast side of Peace River about 1/3 mile below a sharp bend, in SW ¼ Sec. 28, Twp. 93, Rge. 20 W5.

History: Constitutes the upper part of the "Basal Member" of the Peace River formation described by Wickenden (1951). Name taken from Notikewin River which flows into Peace River from the east at a point about 70 miles north of Peace River town. The member crops out near the mouth of the river and the name was used for some time in company reports before publication.

Lithologic Characteristics: Gray, yellowish, and greenish gray, more or less clayey sandstone, fine to medium grained, containing interbeds of light to dark gray shale with ironstone concretions. Fossils are scarce. Some glauconitic beds are present. The sandstone is predominantly marine, locally containing marine fossils, but is interbedded with some non-marine deposits.

Thickness and Distribution: Thickness at the type section 33 feet. Varies in observed thickness elsewhere in the area from 40 to 70 feet.

Relation to other Units: Conformably overlies siltstones and shales of the Falher member of the Spirit River formation; conformably underlies the black shale of the Harmon member of the Peace River formation. The lower contact frequently is difficult to determine but the upper is fairly abrupt.

References:

Wickenden, R.T.D., 1951, Some Lower Cretaceous Sections on Peace River below the Mouth of Smoky River, Alberta, Geol. Sur. Paper 51-16.

Badgley, Peter C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geol. Sur. Can., Paper 52-11.

Prepared by: L. E. Workman, Canadian Stratigraphic Service, Ltd., Calgary, July 1954.

OLDMAN FORMATION: Upper Cretaceous

Author: Russel, L. S. and Landes, R. W., 1940, Geology of Southern Alberta Plains, Canada Geol. Surv., Mem. 221, p. 62.

Locality: Oldman River from near the mouth of the St. Mary River 6 miles south of Lethbridge, forming much of the valley walls, to the vicinity of Lethbridge.

History: The Oldman Formation has been known successively as the Pale and Yellow beds, Pale beds, and Oldman formation.

Lithologic Characteristics: The Oldman formation may be divided into two members. The upper member, referred to as the Lethbridge, consists of carbonaceous sandstones and shales, coal seams, and one or more bentonite beds near the top. The lower member consists of light gray sandstone and shales with minor amounts of greenish, brown and reddish shales with plant fragments and thin beds of siltstone. The shales grade from sandy shale to argillaceous sandstone. The sandstones are generally poorly cemented and, due to argillaceous content, weather to form badland topography. Indurated sandstone lenses are common. The grain size is from fine to coarse. In general it is a fresh-water formation and is world famous for dinosaurian remains.

Thickness and Distribution: 1000 feet at Lethbridge, 400 feet in eastern Alberta. In southwestern Saskatchewan the Oldman loses its identity, being replaced by marine shale.

Relation to other Units: Underlain by the Foremost formation of brackish water origin and overlain by the marine Bearpaw formation, both Upper Cretaceous in age. In the southern Alberta foothills and under large parts of central Alberta plains the Oldman and Foremost formations are together the Belly River formation.

References:

Crockford, M. B., 1949, Oldman and Foremost Formations of Southern Alberta, Bull. Amer. Assoc. Petrol. Geol., Vol. 33, No. 4, pp. 500-510.

Prepared by: D. E. Campau, Canadian Stratigraphic Service Ltd., Calgary, July 1954.

O'SULLIVAN MEMBER: Mannville (Blairmore) formation, Lower Cretaceous age

Author: Nauss, A. W., 1945, Cretaceous Stratigraphy of Vermilion Area, Alberta, Amer. Assoc. Petrol. Geol. Bull. Vol. 29, No. 11.

Locality: Northwest Mannville #1 well in Lsd. 1, Sec. 18, Twp. 50, Rge. 8 W4th Meridian, between the depths of 1838' to 1993'. Continuous cores, on file at Stanford University.

Lithologic Characteristics: Chiefly "salt and pepper" sandstone with grey shale and several prominent coal seams. Towards the base of this member the sands become finer grained, poorly sorted and contain an increasing amount of dark grey chert. Silt, silty shale and coal interbedding become more prominent downward.

Thickness and Distribution: Rests on unconsolidated quartz sand of the Borradaile member, where present, and overlain by dark grey shales of the Lloydminster shale (Colorado group). Cores suggest the contacts are conformable.

Prepared by: J. T. Humphreys, Calgary, July 1954.

OXARART SANDSTONE: Bearpaw formation, Upper Cretaceous, in southeastern Alberta and southwestern Saskatchewan.

Author: Furnival, G. M., 1950, Cypress Lake Map Area, Saskatchewan, Geol. Sur. Can., Mem. 242, p. 42.

Locality: On a small creek a mile west of Oxarart Creek in Sec. 18 and 19, Twp. 6, Rge. 27 W3 M.

Lithologic Characteristics: The member comprises two distinct parts. The upper part is a massive hard grayish green medium grained glauconitic sandstone, with widespread and abundant fossil tree, plant, and root remains. Among these is a widely occurring type consisting of branching nodose forms from ½ inch to 1 inch across and known as Halymenites major. The lower part consists of yellowish brown to buff crossbedded compact to slightly indurated thinly bedded fine to medium grained glauconitic sandstone. A large quantity of brown organic material is interlaminated with the sandstone and at places there are 2-foot thick beds of lignite and 4-inch thick beds of oyster shells in the lower part. Coarse mica is

Thickness and Distribution: About 77 feet thick at the type section, thickening from east to west. The member is about 2 feet thick on the north shore of Cypress Lake in Twp. 6, Rge. 26 W3 M. and 115 feet thick at Thelma, Alberta, a distance of about 40 miles apart.

Relation to other Units: About 25 feet below the base of the Belanger member and about 200 feet below the top of the Bearpaw formation. The upper ledge-forming sandstone is in sharp contact with overlying Belanger dark shales. The base is gradational into underlying dark shales. This transition zone may be as much as 27 feet thick. Correlation of this sandstone with the "Fox Hills", now Blood Reserve, sandstone of the southern Alberta plains was made by early investigators and confirmed by Loranger and Gleddie, 1953.

References:

Loranger, D. M. and Gleddie, J., 1953, Some Bearpaw Zones in Southwestern Saskatchewan and Southern Alberta, Alta. Soc. of Pet. Geol., Third Annual Field Conference and Symposium, p. 158.

Prepared by: J. T. Humphreys, Calgary, July 1954.

PADDY MEMBER: Peace River formation, Lower Cretaceous, in Peace River region.

Author: Alberta Study Group, 1954, Lower Cretaceous of the Peace River Region, Western Canada Sedimentary Basin, Amer. Assn. Pet. Geol., Tulsa, pp. 269-272.

Locality: West-central Alberta in the vicinity of Peace River, in an area from British Columbia boundary as far east as the west end of Lesser Slave Lake and in a north-south direction from Twp. 71 to 96. Type section is Section 2 of Wickenden (1951), located on west side Peace River, about 100 yards South of a small creek, in NE ¼ Sec. 4, Twp. 84, Rge. 21 W5, about ten miles north of Peace River Town.

History: Formerly called the "Continental Member" of the Peace River formation (Wickenden, 1951). Name taken from Paddy's Creek, a small stream that flows into Peace River at Peace River town.

Lithologic Characteristics: White, buff and light grey sandstone, poorly sorted, fine to very coarse, partly silty and carbonaceous, containing thin shale and some coal beds. The deposits are of continental origin.

Thickness and Distribution: Varies in thickness from 0 to 130 feet. Occurs generally in the Peace River area outlined above, being absent in relatively few localities.

Relation to other Units: Disconformably underlain by the Cadotte sandstone member of the Peace River formation and disconformably overlain by the Shaftesbury black shale formation of the Fort St. John (Colorado) group.

References:

Wickenden, R.T.D., 1951, Some Lower Cretaceous Sections on Peace River below the Mouth of Smoky River, Alberta, Geol. Sur. Can. Paper 51-16.

Badgley, Peter C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geol. Sur. Can. Paper 52-11, p. 8.

Prepared by: L. E. Workman, Canadian Stratigraphic Service, Ltd., Calgary, July 1954.

PAKAN FORMATION: Belly River formation, Upper Cretaceous

Author: Allan, J. A. (1918), Sections along North Saskatchewan River and Red Deer and South Saskatchewan, Canada Geological Survey Summary Report, 1917, pt. C, p. 12, and fig. 2.

Locality: "The lower part is exposed on Egg Creek, Twp. 58, Rge. 17 W4., about a mile from the mouth, and also at the North end of Pakan Ferry."

Lithologic Characteristics: "The Pakan formation includes a thin bedded, variegated series of arenaceous shales, thin coal seams, thin grey sandstones, and sandy clays." Fresh water origin.

Thickness and Distribution: Thickness of 225 feet. Allan did not assign an area but mapped it over a distance of more than 20 miles along the North Saskatchewan River.

Relation to other Units: Underlain by the Victoria sandstone and overlain by the Myrtle Creek formation; all units being within the Belly River formation. Equivalent to the "variegated beds" of the Oldman member as reported by Shaw and Harding.

References:

Shaw, E. W. and Harding, S.R.L. (1954), Lea Park and Belly River Formations of East-Central Alberta. Western Canada Sedimentary Basin, American Association of Petroleum Geologists Symposium, pp. 297-308.

Mauss, A. W. (1945), Cretaceous Stratigraphy of Vermilion Area, Alberta, Canada, Bulletin American Association of Petroleum Geologists, Volume 29, pp. 1605-29.

Slipper, S. E. (1918), Viking Gas Field, Central Alberta, Geol. Survey Canada Summ. Rept., 1917, pt. C., pp. 9-13.

Prepared by: R. H. Erickson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

PALLISER FORMATION: Upper Devonian

Author: H. H. Beach, 1943, Moose Mountain and Morley Map Areas, Alberta, G.S.C. Memoir 236, pp. 15-17.

Locality of Type Section: The whole of the Palliser Range of the Rocky Mountains and more especially the southern end of this range at the north end of Lake Minnewanka is considered to be the type section.

History: The formation was termed "Lower Banff limestone" by McConnell (1887) and Minnewanka formation (upper part) by Shimer (1926).

Lithologic Characteristics: Fine grained fossiliferous black limestones in the uppermost 75 to 100 feet (Costigan member of DeWit and McLaren) with pyrite nodules common in the top 2 feet. The remainder of the formation (Morro member of DeWit and McLaren) is composed of massive beds of grey mottled dolomitic limestone characterized by irregular branching tracery standing out in relief on weathered surfaces.

Thickness and Distribution: Thickness varies from approximately 800 feet in the foothills to about 1000 feet in the front ranges. The name is applied in the foothills and front ranges of the Rocky Mountains from the Alberta-Montana border northward to beyond the town of Jasper.

Relation to other Units: The Palliser correlates with the Wabamun formation of the Edmonton area and with the Three Forks formation of southern Alberta. It conformably overlies the light grey dolomite and arenaceous dolomite of the Fairholme formation and is disconformably overlain by the black shales of the Exshaw formation.

References:

DeWit, R. and McLaren, D. J., 1950, Devonian Sections in the Rocky Mountains between Crowsnest Pass and Jasper, Alberta, G.S.C. Paper 50-23, Page 6.

Shimer, H. W., 1926, Upper Paleozoic Faunas of the Lake Minnewanka Section, near Banff, Alberta, Can. Geol. Sur., Bull. 42, Series No. 45, pp. 1-24.

Prepared by: D. O. Stewart, Socony-Vacuum Exploration Co., Calgary, July 1954.

PASKAPOO FORMATION: Paleocene

Author: Tyrell, J. B., 1887, Report on a Part of Northern Alberta and Portions of the adjacent Districts of Assiniboia and Saskatchewan, Geol. Surv. Canada, Ann. Rept. (1886), New Ser., Vol. II. Pt. E, pp. 127E-132E.

Locality: Blindman River, central Alberta. (Paskapoo is an Indian word for Blindman).

Lithologic Characteristics: "The beds consist of more or less hard, light grey or yellowish, brownish weathering sandstone, usually thick bedded, but often showing false bedding; also of light bluish-grey and olive sandy shales, often interstratified with bands of hard, lamellar ferruginous sandstone, and sometimes with bands of concretionary blue limestone...The sandstone consists of very irregular, though slightly rounded, grains of quartz, feldspar, and mica, cemented together in a calcareo-argillaceous matrix."

Thickness and Distribution: About 800 feet thick in the Red Deer area. In southern Alberta 3000 feet have been assigned to the Paskapoo. Tyrell recorded 5700 feet on Little Red Deer River, but this is probably excessive. Occurs as the surface or near-surface formation in the Alberta syncline.

Relation to other Units: The Paskapoo lies disconformably on the Edmonton formation or equivalents, and is disconformably overlain by Quaternary.

References:

Allan, John A., and Sanderson, J.C.G., 1945, Geology of Red Deer and Rosebud Sheets, Alberta, Research Council of Alberta, Rept. No. 13.

PEACE RIVER FORMATION: Ft. St. John group, Lower Cretaceous

Author: McConnell, R. G., 1893, Geological Survey Can. Ann. Rept., Vol. 5, pt. D.

Locality: According to McConnell, p. 56D "The Peace River sandstones —— appear from beneath the latter (Ft. St. John shales) in descending the river immediately below the Smoky River Forks, and are then exposed in the banks of the valley down to about three or four miles below Battle River" (now Notikewin River).

Lithologic Characteristics: McConnell, p. 56D - "The Peace River sandstones consist of heavy massive beds of yellowish and grayish soft coarse sandstones, alternating with bands of thin-bedded sandstones and shales. The massive beds have an occasional thickness of fifty feet or more, and weather into a series of steep cliffs separated by sloping terraces cut out of the shaly bands. Lignite seams occur occasionally, and hard sandstone concretions ranging from a few inches to ten or fifteen feet in diameter form a prominent feature of the formation. In descending Peace River, the Peace River sandstones become more argillaceous, decrease gradually in thickness and at length disappear a few miles below the mouth of Battle River". In 1951, Wickenden described the Peace River formation as consisting of the following:

Continental member
Cadotte member
Middle shale member
Basal member

In 1952 (printed 1954) a study group of the A.S.P.G. under the chairmanship of L. E. Workman, restricted the Peace River formation and redefined it so that it contained the following:

Paddy member	0 - 130 feet,	average 60
Cadotte member	40 - 170 feet,	average 70
Harmon member	40 - 110 feet,	average 60

Thickness and Distribution: As redefined, the Peace River formation averages 190 feet in thickness and in the cross section accompanying the A.S.P.G. study group report, the formation is recognized in subsurface from the Alberta - British Columbia boundary eastward to the south shore of Lesser Slave Lake.

Relation to other Units: The formation is underlain by the siltstones and sandstones of the Notikewin member of the Falher formation and is in turn overlain by the dark marine shales of the Shaftesbury formation.

References:

McLearn, F. H., 1917, Geol. Surv. Can. Summ. Rept. 1917, pt. B, p. 15C.
McLearn, F. H., 1944, Revision of the Lower Cretaceous of the Western Interior of Canada, Geol. Surv. Can. Paper 44-17.
Wickenden, R.T.D., 1951, Some Lower Cretaceous Sections on Peace River below the Mouth of Smoky River, Alberta, Geol. Surv. Can. Paper 51-16.
Alberta Study Group, 1954, Lower Cretaceous of the Peace River Region, Western Canada Sedimentary Basin, Amer. Assoc. Petrol. Geol., Tulsa, Okla.
Badgley, Peter C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geol. Surv. Can. paper 52-11.

Prepared by: Joseph Gleddie, Imperial Oil Limited, Calgary, July 1954.

PELICAN SAND: Colorado Group, Upper Cretaceous

Author: McConnell, R. G., 1891, District of Athabasca Comprising the Country between Peace River and Athabasca River north of Lesser Slave Lake. Geol. Surv. Can. Annual Report 1890-91 p. 28D.

Locality: At the mouth of Pelican River, Twp. 79, Rge. 17 W4 M.

History: The name Pelican was applied by McConnell (1893) to two distinct lithologic members, the Pelican sand and the Pelican shale. As it is not considered good practice to use a lithological term as part of a formational name, Wickenden (1949) separated these distinct types into two formations, retaining the name Pelican for the sand formation.

Lithologic Characteristics: According to Wickenden (1949 p. 12) the formation "is composed mostly of light grey to white sand, with variable lenses of dark gray shale. Pebble zones occur in various parts of the formation in different localities, although they are most common near the top of the formation. The presence of glauconite in much of the sand and the occurrence of an ammonite at one locality indicates that the beds are of marine origin, although here and there small concentrations of carbonaceous or coaly material were observed, indicating that a source of vegetable matter, probably land plants, was not far distant".

Relation to other Units: The formation is underlain by the Joli Fou formation and is in turn overlain by the shales of the Colorado group.

Thickness and Distribution: McConnell gives a thickness of 40 feet. The formation and its equivalents are known to occur throughout a wide area in Alberta as shown by the correlation charts accompanying the report by Badgley (1952).

References:

McLearn, F. H., 1916, Summary Rept. Geol. Survey Dept. of Mines, p. 145.

Wickenden, R.T.D., 1949, Some Cretaceous sections along Athabasca River from the mouth of Calling River to below Grand Rapids, Alberta, Geol. Survey Can. Paper 49-15.

Badgley, P. C., 1952, Notes on the subsurface stratigraphy and oil and gas geology of the Lower Cretaceous series in Central Alberta, Geol. Survey Canada Paper 52-11, 1952.

Prepared by: Joseph Gleddie, Imperial Oil Limited, Calgary, July 1954.

PERDRIX FORMATION: Fairholme group, Upper Devonian

Author: Raymond, P. E., 1930, Paleozoic Formations in Jasper Park, Alberta, Amer. Jour. Sci., 5th ser., Vol. 20, pp. 289-300.

Locality: Roche Miette, Jasper National Park, Alberta; on south side of Edmonton-Jasper Highway about 6 miles from park gates, immediately west of the turn-off to Miette Hotsprings.

Lithologic Characteristics: Black, dark grey to greenish grey shale, calcareous, in part non-calcareous. Calcareous nodules and argillaceous limestone layers present especially in upper part of formation.

Thickness and Distribution: 350-550, thins from east to west. Extends as far south as the North Saskatchewan River in the mountains and to the Clearwater River area in the foothills. North of the Athabaska River area its extent remains unknown.

Relation to other Units: Rests on limestone or dolomite of the Flume formation (Middle or Upper Devonian). Transitional into the argillaceous limestones of the overlying Mount Hawk formation (Upper Devonian) and is distinguished by being less calcareous. Correlated with the upper part of the lower member of the Fairholme formation of the Banff area.

References:

deWit, R. and McLaren, D. J., 1950, Devonian Sections in the Rocky Mountains between Crowsnest Pass and Jasper, Alberta, Geological Survey of Canada, Paper 50-23.

Fox, F. G., 1951, Devonian Stratigraphy of Rocky Mountains and Foothills between Crowsnest Pass and Athabaska River, Alberta, Canada, Amer. Assoc. Petrol. Geol. Bull., Vol. 35, No. 4, pp. 822-843.

Warren, P. S. and Stelck, C. R., 1950, Succession of Devonian Faunas in Western Canada, Trans. Roy. Soc. Can., Vol. XLIV, ser. III, section 4, pp. 61-78.

Prepared by: F. H. Trollope, Socony-Vacuum Exploration Company, Calgary, July 1954.

PINE POINT FORMATION: Middle Devonian

Author: Cameron, A. E., 1922, Geological Survey of Canada, Summary Report, 1921, Part B., pp. 1-44.

Locality: Pine Point and Fort Resolution, Great Slave Lake, about 50 miles and 75 miles respectively east by water from Hay River village, Northwest Territories.

Lithologic Characteristics: Thin bedded bituminous limestone, grey to black in color and in places very shaly.

Thickness and Distribution: No complete sections exposed. At Imperial Oil Company's well at Nitsi (Windy) Point, Great Slave Lake, a thickness of 593 feet has been assigned to the Pine Point formation.

Relation to other Units: Rests on the Fitzgerald dolomite and overlain by the Presquile dolomite.

Prepared by: W. I. Wright, Socony-Vacuum Exploration Co., Calgary, July 1954.

PINE RIVER FORMATION: Regarded originally as of Jurassic age but now as of Lower Cretaceous age.

Author: Spiecker, E. M. (1920), Report of Oil Surveys in the Peace River District 1920, B.C. Dept. of Lands, 1921, also A.A.P.G. Bull., Vol. 6, No. 2, (1922), pp. 112-138.

Locality: "It occurs at the surface on the crest of the Pine River anticline, being exposed in the narrow valley of Crassier Creek for a distance of about 4 miles above its mouth".

Lithologic Characteristics: "It consists chiefly of firm blue-black clay shale, the lowest observable beds of which are remarkably pure, being almost entirely free from sand and presenting the appearance of a hardened, uncontaminated black clay. In this respect it differs from most other marine black shales of the general region, which are almost uniformly sandy. Interspersed with the shale are bands of limestone and sandstone in thicknesses from a few inches up to 20 feet or more; the limestone is very compact and hard, steel-grey on fresh fracture, and, varying with changes in porosity, weathers into shapes ranging from angular to guarded or rounded in outline. The color of its weathered surface is greyish-yellow".

The section described by Spiecker was subsequently assigned to the Moosebar formation (lowest formation of the Fort St. John group) by R.T.D. Wickenden and G. Shaw, Geol. Survey of Canada paper 43-13 who state that "the contact (of the Moosebar) with the Bullhead can be seen on Hasler Creek, but the sections showing most of the formation (Moosebar) is exposed on Crassier Creek about 3 miles north of Pine River. --- The lowest member exposed in this section is probably not more than 50 feet stratigraphically above the Bullhead, and the true thickness of the exposed beds is calculated to be about 540 feet ----. The beds described (by Wickenden and Shaw) are apparently those referred to by Spiecker (1920) as 'Pine River Shales' older than the Bullhead and probably of Jurassic age. Their position in the sequence of formations both here and on Hasler Creek makes it obvious now that they are part of the Moosebar formation and that they are younger than the Bullhead group. ---"

Thickness and Distribution: According to Wickenden and Shaw "Results as a whole seem to indicate that the Moosebar (Pine River Shales) in the vicinity of Pine River is at least as thick as, and possibly thicker than, on Peace River, where it is about 800 feet thick.

Relation to other Units: The Moosebar formation (Pine River shales) rests on the largely non-marine sandstones, shale, conglomerate and coal of the Bullhead group and are in turn overlain by the marine and non-marine sandstones and shales of the Commotion formation.

Remarks: It is herewith recommended that the term 'Pine River' no longer be applied to these beds.

References:

McLearn, F. H., 1922, Geol. Surv. Can. Sum. Rept. 1922, p. B., p. 5B.
Wickenden, R.T.D., and Shaw, G., 1943, Stratigraphy and Structure in Mount Hulcross - Commotion Creek Map-Area, British Columbia, Can. Dept. Mines and Res., Mines and Geology Branch, Geol. Sur. Paper 43-13.

Prepared by: Joseph Gleddie, Imperial Oil Limited, Calgary, July 1954.

PORCUPINE HILLS FORMATION: Paleocene

Author: Dawson, G. M., 1883, Report on the Region in the vicinity of the Bow and Belly Rivers, N.W.T., Geol. Surv. Canada, Rept. of Progress, (1880-81-82), p. 83.

Locality: Porcupine Hills, southwestern Alberta.

Lithologic Characteristics: (Hage 1945) "The Porcupine Hills formation ... is composed of light and dark grey shale interbedded with fine to coarse grained, grey, limy sandstone in fairly well indurated beds from 20 to 50 feet thick. The basal beds are gradational into underlying Willow Creek strata. Sandstones at the base contain detrital coal fragments and a few calcareous pellets, and the light grey shale carries calcareous concretions."

Thickness and Distribution: 3500 feet maximum recorded in Porcupine Hills. Occurs in Porcupine Hills area in southwestern Alberta.

Relation to other Units: Overlies Willow Creek formation and is disconformably overlain by Quaternary.

References:

Hage, C. O., 1945, "Cowley," Geol. Surv. Canada, Map 816A.
Williams, M. Y. and Dyer, W. S., 1930, Geology of the Southern Alberta and Southwestern Saskatchewan, Geol. Surv. Canada, Memoir 163, pp. 13-34.

POTLATCH MEMBER: Three Forks Formation, Upper Devonian

Author: Perry, E. S., 1929, The Kevin Sunburst and Other Oil and Gas Fields of the Sweetgrass Arch, Montana Bureau Mines and Geol. Mem. 1, 2nd Edition, p. 5.

Locality of Type Section: The type subsurface section is found in the Potlatch-Adams No. 1 deep well in Section 21, Township 34 N, Range 1 W, in the Kevin Sunburst oilfield, Montana. A set of these cuttings is kept at the Montana School of Mines in Butte Montana.

History: Perry used the name "Potlatch Anhydrite" to describe a section at the top of the Upper Devonian thought to be approximately equivalent to the Jefferson formation of the type section in southern Montana. It is now considered to be the equivalent of both the Three Forks and Jefferson dolomite formations of the type section.

The term "Potlatch" is now applied in Alberta to the lower member of the Three Forks formation although originally the term referred to an interval equivalent to the entire Three Forks formation.

Lithologic Characteristics: The Potlatch of Alberta consists of massive anhydrite interbedded towards the base with brown, dense to sugary dolomites. The bottom five to fifteen feet is composed of a silty dolomite or dolomitic siltstone. Salt is locally developed in the lower part of the member in the Drumheller, Big Valley area.

Thickness, Distribution and Relation to other Units: The Potlatch member is co-extensive with the Three Forks formation, extending from the Alberta-Montana border on the south to the edge of the Devonian green shale basin on the north. To the west in the foothills belt it becomes approximately equivalent to the Palliser formation, and to the east in Saskatchewan it becomes part of the Qu'Appelle group. The Potlatch member of Alberta is overlain by the greenish grey non-calcareous shale of the Grassy Lake member and underlain by the brown limestones and dolomites of the Jefferson formation.

References:

Sloss, L. I. and Laird, W. M., 1947, Devonian System in Central and Northwestern Montana, A.A.P.G. Bulletin Vol. 31, No. 8, Pages 1404-1430. August 1947.

Prepared by: D. O. Stewart, Socony-Vacuum Exploration Co., Calgary, July 1954.

POUCE COUPE SANDSTONE MEMBER: Smoky River shale, Upper Cretaceous

Author: Warren, P. S. and Stelck, C. R., 1940, Cenomonian and Turonian Faunas in the Pouce Coupe District, Alberta and British Columbia, Trans. Royal Society of Canada Sec. IV, p. 143.

Locality: Along Pouce Coupe river near the mouth of Saskatoon creek, Ld. 3, Sec. 30, Twp. 79, Rge. 13 W6 M, and along Doe Creek in N. ½ Sec. 10, Twp. 81, Rge. 13 W6 M.

Lithologic Characteristics: The Pouce Coupe member at the type locality consists of clean quartz sandstone.

Thickness and Distribution: At the type locality it is 30 feet thick. A sandstone similar to the Pouce Coupe sandstone and occupying approximately the same stratigraphic position is exposed along Howard Creek in Twp. 79, Rge. 6 W6 M.

Relation to other Units: Occupies the topmost member of the transitionary zone lying at the base of the Kaskapau formation. Near Pouce Coupe the zone is 300 feet thick, at Spirit River 230 feet thick and on the Smoky River it is probably less than 75 feet thick. Warren and Stelck (ibid p. 144) place the Cenomonian-Turonian boundary just above the Pouce Coupe sandstone which contains the Dunveganoceras fauna.

References:

Gleddie, J., 1949, Upper Cretaceous in the Western Peace River Plains, Alberta, A.A.P.G. Vol. 33, No. 4, April 1949, pp. 511-532.

Prepared by: Joseph Gleddie, Imperial Oil Limited, Calgary, July 1954.

PRINCESS SAND: Blairmore formation, Lower Cretaceous

Author and Locality: The name is believed to have been applied first to bit cuttings from wells such as California Standard Princess C.P.R. 14-22A, located in Lsd. 8, Sec. 22, Twp. 20, Rge. 12 W4 M., which was drilled in the period May to August, 1947.

Lithologic Characteristics: It consists of a medium to coarse grained sandstone with abundant chert.

Thickness and Distribution: It has a wide distribution in the Princess area where its thickness is usually approximately 30 feet.

Relation to other Units: The Princess sand lies at the base of the Blairmore formation and is fequently underlain by a residual zone consisting of waxy varicolored shales with chert, limestone and dolomitic fragments. It contains the same type sand as the Sunburst and the two names are used interchangeably.

References:
The writer is not aware of any published literature in which the name 'Princess sand' appears.

Prepared by: Joseph Gleddie, Imperial Oil Limited, Calgary, July 1954.

PURCELL LAVA: Precambrian, Purcell Series. Lewis Overthrust sheet of southwestern Alberta and northwestern Montana; Purcell Range of British Columbia.

Author: Daly, R.A. (1912), Geology of the North American Cordillera at the Forty Ninth Parallel; Geol. Surv. Canada, Memoir 88, pp. 213-214.

Locality: The type locality is in the Purcell Mountains in southeastern British Columbia.

Lithological Characteristics: Dark greenish-grey to purple and black, amygdaloidal, scoreaceous, diabasic gabbro flows. White amygdules of quartz and calcite are abundant near the top of the formation, and near the tops of individual flows. At the upper contact there is typical ropy structure. Locally, large stellate aggregates of plagioclase feldspar occur.

Thickness and Distribution: In the Waterton area the thickness of the main sill, which is generally meant by the term "Purcell Lava", is about 200 feet. It thickens very greatly to the westward, in the Purcell Range. The true thickness of the Purcell intrusives should, of course, include the sills which are present in the Altyn, Appekunny, Grinnell, and Siyeh formations. Purcell intrusives occur throughout the Clarke Range of Alberta and Montana, and the Purcell Range of British Columbia. They do not occur elsewhere in Alberta.

Relation to Other Units: Succeeds the Siyeh formation conformably; overlain conformably by the Sheppard formation.

Reference:

Rice, H.M.A. (1937), Cranbrook Map-Area, British Columbia; Geol. Surv. Canada, Memoir 207, pp. 13-18.

Prepared by: F. G. Fox, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

RAMPARTS FORMATION: Middle Devonian, possibly in part Lower Devonian

Author: Hume and Link, 1945, Geol. Survey of Canada, Paper 45-16.

Locality: Type section for lower and middle members is on the Mountain River, thirty miles above the junction with the Mackenzie on the flank of the Imperial Range, N.W.T. Type section for upper member is at the "Ramparts" just above Fort Good Hope on the Mackenzie River, N.W.T.

History: Kindle and Bosworth, 1920, described upper limestone member as the Ramparts and Beavertail formations, with type sections at the "Ramparts" and Beavertail Point, twelve miles below the Sans Sault Rapids, while the middle shale member was described by them as the Hare Indian River formation. The lower limestone member was not recognized by Kindle and Bosworth.

Lithologic Characteristics: Grey, massive limestones in the lower part, a series of dark grey and limy shales and limestones in the middle part and massive, buff limestones in the upper part.

Thickness and Distribution: At the type section the lower and middle members are respectively 180 feet and 700 feet thick. At the "Ramparts" the upper member is 245' thick. The combined middle and upper members range from 2000 feet thick in the Imperial Mountains to 400 feet around Fort Norman, the middle shale member having thinned most. The formation is present in the South Nahanni River area and in extreme north-central B.C. adjacent to the Alaska Highway, where it consists of 1000 feet of hard limestones, showing cyclic deposition.

Relation to other Units: Rests disconformably on Bear Rock formation (Silurian or Lower Devonian) around Fort Norman and on the Muncho formation in north-central British Columbia, and underlays the Fort Creek (Upper Devonian) formation.

References:

Kindle and Bosworth, 1920, Can. Geol. Survey, Summ. Report 1920, Pt. B.

Stewart, J. S., 1945, Recent Exploratory Deep Well Drilling in Mackenzie River Valley, N.W.T., Can. Geol. Survey, Paper 45-29.

Laudon and Chronic, 1949, Paleozoic Stratigraphy along the Alaska Highway, Bull. A.A.P.G., Vol. 33, pp. 195-219.

Kingston, D. R., 1951, Stratigraphic Reconnaissance along the Upper South Nahanni River, N.W.T., Bull. A.A.P.G., Vol. 35, p. 2224.

Prepared by: Canada-Cities Service Petroleum Corporation, Calgary, July 1954.

RAVENSCRAG FORMATION:

Authors: Davis, N. B., (1918), Report on the Clay Resources of Southern Saskatchewan, Mines Branch, Department of Mines, Canada, No. 468, (Defined "Ravenscrag Beds"). Fraser, F. J., McLearn, F. H., Russell, L. S., Warren, P. S., and Wickenden, R.T.D., (1935), Geology of Southern Saskatchewan, Geol. Surv. Canada, Mem. 176, (Defined "Ravenscrag formation").

Locality: Ravenscrag Butte, Saskatchewan.

UPPER RAVENSCRAG: Paleocene, Tertiary

Lithologic Characteristics: Buff, grey, white, sandy clays, sands, shales, and coal.

Thickness: The thickness of the formation ranges from 530 feet to approximately 800 feet.

Relation to other Units: The Upper Ravenscrag is overlain by the Swift Current formation (Eocene) and is underlain by the Lower Ravenscrag (Cretaceous). It was mapped by Davis in 1918 as Estevan, by Rose in 1916 as Fort Union and by McConnell in 1885 as the upper part of the Laramie formation. The Willowbunch member was named by McLearn in 1930 and is found in the upper part of the Upper Ravenscrag.

LOWER RAVENSCRAG: Cretaceous

Lithologic Characteristics: Thick beds of massive cross-bedded sands, medium to fine-grained, have clay pellets, cemented, are rarely dolomitic or calcareous, are grey to greenish grey in color, and weather yellowish to yellowish-green.

Thickness: The thickness of the Lower Ravenscrag ranges from 20 to 190 feet.

Relation to other Units: The unit is underlain by the Whitemud formation (Cretaceous) and is overlain by the Upper Ravenscrag (Paleocene). It is thought that the unit correlates with the Hell Creek member of the Lance formation.

References:

Williams, M. Y., and Dyer, W. S. (1930), Geology of Southern Alberta and Southwestern Saskatchewan; Geol. Surv., Canada, Mem. 163.

Prepared by: V. B. Coombs, Texaco Exploration Company, Calgary, July 1954.

RIBBON SAND: (Also called Ribboned sand) of disputed Lower Cretaceous - Jurassic age.

Author and Locality: The name is believed to have been applied first to bit cuttings from wells drilled in Toole County, Montana such as "56" Pet. Co. Barkuloo No. 1, NW SW Sec. 26, Twp. 35N, Rge. 4W.

Lithologic Characteristics: According to Blixt, the so-called 'Ribbon sand' "is extremely fine-grained and fairly soft so that it is usually logged as 'brown shale' by the drillers. Actually it is neither and should be classified as a siltstone. It is glauconitic throughout, grades downward to a very fine sandstone at the base, and is laminated with black micaceous shale".

Thickness and Distribution: Blixt reports that the total siltstone-sandstone zone is uniformly 60-70 feet thick and that it occurs everywhere on the Kevin-Sunburst dome and over an undetermined area of the Sweetgrass arch.

Relation to other Units: The Ribbon sand "lies above the marine calcareous shale of the Ellis formation and below the yellow mudstone marker in the Kootenai. It, therefore, occupies the same stratigraphic position as the Cut Bank sand at the west. However, it cannot be stated conclusively that the two are correlative. ..... Many geologists place the Ribbon sand in the top of the Ellis formation or in the base of the Kootenay (of Canada) because they believe it is correlative with a ribboned sandstone of disputed age occurring either at the top of the Fernie (Ellis) or at the base of the Kootenay (of Canada) in the foothills of the Rocky Mountain Front in Alberta" (Blixt 1941, p. 363). Clow and Crockford place the "ribbon sands" at the top of the Fernie (Jurassic) formation in the Carbondale River area of the foothills and mountainous district of southwestern Alberta.

References:

Blixt, J. E., 1941, Cut Bank oil and gas field, Glacier County, Montana, A.A.P.G. Stratigraphic Type Oil Fields, p. 327.

Erdmann, C. E. and Schwalbrow, J. R., 1941, Border-Red Coulee, Montana and Alberta, A.A.P.G. Stratigraphic Type Oil Fields, p. 292.

Clow, W.H.A. and Crockford, M.B.B., 1951, Geology of Carbondale River Area, Alberta, Research Council of Alberta Rept. No. 59, p. 22.

Prepared by: Joseph Gleddie, Imperial Oil Limited, Calgary, July 1954.

RIERDON: Middle and Upper Jurassic

Author: Cobban, W. A., 1945, Marine Jurassic Formations of Sweetgrass Arch, Montana, Bull. Amer. Assoc. Petrol. Geol., Vol. 29, No. 9, pp. 1262-1303.

Locality: Rierdon Gulch, Sec. 23, Twp. 24N, Rge. 9 W, Montana, Teton County, Montana.

Lithologic Characteristics: In Alberta the Rierdon has been described as a marine, fossiliferous formation consisting of limestones, calcareous shales and sandy limestones. The shales in Alberta are greenish grey or dull olive green. They grade imperceptibly into argillaceous limestone beds 1-3 feet thick. Individual limestone beds have considerable lateral extent.

Thickness and Distribution: Wier, 1949, shows the Rierdon formation to cover almost all of Southern Alberta. The northern edge is very irregular due to pre-Blairmore erosion.

Relation to other Units: The Rierdon is the middle member of the Ellis group and is overlain by the Swift, when not removed by Pre-Cretaceous erosion, and overlies the Sawtooth.

References:

Weir, J. D., 1949, Marine Jurassic Formations of Southern Alberta Plains, Bull. Amer. Assoc. Petrol. Geol., Vol. 33, No. 4, pp. 547-563.

Prepared by: Sun Oil Company, Calgary, July 1954.

ROCKY MOUNTAIN FORMATION: Permo-Pennsylvanian

Author: Dowling, D. B., 1907, Report on the Cascade Coal Basin, Alberta, Geol. Survey Canada, Pub. 949, pp. 1-37.

Locality: None designated. Exposed at some localities along the front range of the Rocky Mountains.

Lithology: Shows gradations between dolomite and quartzite with variations in silica content. Chert beds occur particularly towards the top of the formation.

Subdivided in the Banff area by Warren into the Tunnel Mountain, or lower member, and the Mount Norquay, or upper member. The lower member is composed mainly of massive quartzitic sandstones, silicified dolomite and chert while the upper much less massive member consists of siliceous dolomite, bedded chert, phosphatic beds, and brown shale partings.

Distribution and Thickness: The formation outcrops at various localities along the front range of the Rocky Mountains. It is absent in the plains area of Southern Alberta but a considerable thickness is present in the subsurface of the Peace River Plains area, and outcrops occur in the foothills of Northeastern British Columbia. Although the formation is restricted to some degree because of post-Permian erosion, it is probable that its original extent was in little excess of the present distribution.

The succession in the Rocky Mountains is thin, ranging generally from 150' to 300' but thicker sections to the amount of 500' to 1000' are encountered in the subsurface of the Peace River Plains.

Relation to other Units: The formation rests unconformably on Mississippian strata and is in turn overlain unconformably by Triassic sediments. These criteria, together with general lithology, are used to tentatively assign the formation to the Permo-Pennsylvanian.

References:

Fox, F. G., 1953, Glossary of formation names of Southwestern Alberta, Alberta Society of Petroleum Geologists Third Annual Field Conference and Symposium, p. 198.

Webb, J. B., 1951, Geological History of Plains of Western Canada, Bulletin of the American Association of Petroleum Geologists, Nov., 1951.

Warren, P. S., 1947, Age and Subdivisions of the Rocky Mountain Formation at Banff, Alberta, Bull. Geol. Soc. Amer., abs., Vol. 58, No. 12, Pt. 2, p. 1238.

Prepared by: J. R. Patterson, Western Leaseholds Ltd., Calgary, July 1954.

RUNDLE GROUP: Middle and Upper Mississippian

Author: Kindle, E. M., 1924, Standard Paleozoic Section of the Rocky Mountains near Banff, Alberta, Pan, Am. Geol., Vol. XLII, p. 113-124. Douglas (1953, p. 68) raised the Rundle to the status of a group.

Locality: North end of Mount Rundle, at Banff, Alberta.

Lithologic Characteristics: (Warren 1927) "The Rundle formation consists of thick-bedded to massive, light grey to dark grey, coarse-grained limestone alternating with beds of dark grey to black, fine-grained limestone with or without chert nodules. The chert nodules are more characteristically developed in the fine-grained beds and are more common in the lower part of the formation. The coarser grained beds do not, as a rule, contain chert nodules. Some of the lighter colored beds are very coarse grained, containing many fragments of crinoid columns and brachiopods; they probably represent shallow water conditions of deposition. The limestone weathers grey, the finer-grained beds assuming a much darker grey than the coarser-grained beds. The alternation of these two types of beds produces a very distinct banding of light and dark grey where a section of the formation is well exposed.

Relative to Rundle subdivision, Fox (1953, p. 197) states: "Beach, in an unpublished communication to the Alberta Society of Petroleum Geologists, divided the Rundle into three members, in ascending order as follows: Dyson Creek member, Shunda member, and Tunnel Mountain member. Douglas divided the Rundle into four members, which he found applicable in the Livingstone Gap Area north of Coleman."

Thickness and Distribution: 2288 feet at type section; 2431 feet on Tunnel Mountain. Thickness is less in most sections in Front Ranges and the foothills. Thins eastward, but lower part occurs in large part of Southern Alberta.

Relation to other Units: Conformably overlies Banff formation and is disconformably overlain by Rocky Mountain formation in the front ranges. Unconformably overlain by the Fernie formation, usually, in the foothills, and by the Lower Cretaceous in the Plains.

References:

Beach, H. H., 1943, Moose Mountain and Morley Map-Areas, Alberta, Geol. Surv., Canada, Memoir 236, pp. 23-31.
Beales, F. W., 1950, The Late Paleozoic Formations of Southwestern Alberta (Preliminary Account), G.S.C. Paper 50-27.
Douglas, R.J.W., 1950, Callum Creek, Langford Creek, and Gap Map-Areas, Alberta, Geol. Surv., Canada, Memoir 255, pp. 13-17.
Douglas, R.J.W., 1953, A.S.P.G. Field Conference and Symposium, pp. 68-88.
Fox, F. G., 1953, ibid, p. 197.
McConnell, R. G., 1887, Geol. and Nat. Hist., Surv. Canada, Ann. Rept., Pt. D.
Warren, P. S., 1937, Banff Area, Alberta, Geol. Surv., Canada, Memoir 153, pp. 27-34.

Prepared by: Union Oil Company of California, Calgary, July 1954.

RYEGRASS MEMBER: Bearpaw formation, Upper Cretaceous

Author: Link, Theodore A. and Childerhose, A. J., 1931, Bearpaw shale and Contiguous formations in Lethbridge Area, Alberta, A.A.P.G. vol. 15, No. 10, pp. 1227-1249.

Locality: On the east bank of Oldman River, just above its junction with Belly River (S.W. ¼ Sec. 34, Twp. 9, Rge. 23 W4 M). Named from the Rye Grass Flats located across the river to the west.

Lithologic Characteristics: It is a conspicuous light greenish blue bentonitic sandstone, with a dark blue 4-foot shale break. The bright, vivid bluish color distinguishes it from any other bed in the entire Bearpaw section. Locally it is very coarse, cross-bedded and ripple-marked.

Thickness and Distribution: At the type locality about 30 feet of this sandstone is exposed during low water, but diamond-drill holes reveal a section at least 90 feet of which is dominantly sandstone.

Relation to other Units: The top of the Ryegrass member is 642 feet above the base of the Bearpaw and 84 feet below the top of the Bearpaw shale. The member is overlain by typical dark blue Bearpaw shale which becomes more sandy as the Fox Hills sandstone is approached. There is no doubt that this sandstone could easily be used as the base of the Fox Hills sandstone or the Edmonton beds in churn drill and rotary cuttings. Locally it is very coarse, cross-bedded and ripple-marked. Its presence may account for some of the lesser thicknesses ascribed to the Bearpaw shale in nearby areas. It is also very probable that westward from this area practically all of the section below the true Fox Hills sandstone, including the Ryegrass sandstone, might be logged as part of the former, because of the changes to sandy conditions in this part of the section.

References:

Loranger, D. M. and Gleddie, J., 1953, Some Bearpaw Zones in Southwestern Saskatchewan and Southern Alberta, A.S.P.G. Field Conference and Symposium, Field Guide Book, p. 158.

Prepared by: Joseph Gleddie, Imperial Oil Limited, Calgary, July 1954.

ST. PIRAN FORMATION: Lower Cambrian.

Author: Walcott, C.D. (1908), Nomenclature of some Cambrian Cordilleran Formations, Smithsonian Misc. Coll., Vol. 35, No. 1, pp. 2-5.

Type Locality: Mount St. Piran west of "Lake Louise" in Banff National Park, Alberta.

Lithologic Characteristics: "Mainly gray, quartzitic sandstones, with a few bands of siliceous shale." (Walcott, 1908, p. 5). This is essentially a sandstone formation with some greenish silicious and arenaceous shales in its upper portion. The sandstones are more or less quartzitic in the middle and lower parts of the section, and vary in color from light gray to dirty gray, brownish, purplish and pink" (Walcott, 1928, p. 252).

Thickness & Distribution: Upper Kickinghorse Canyon at Mount Stephen. North and South sides of Bow River Valley from Mount Bosworth to Castle Mountain. In the upper Saskatchewan Valley in the cliffs on the south side of Siffleur River. South it presumably occurs in the Mount Assiniboine massif above Gog Lake, and north in the ridge of Wedgewood Peak. 2640' (Walcott, 1908, p. 5); 2705' (Walcott, 1928, p. 252). Thinner and covered elsewhere.

Relation to Other Units: Underlies Mount Whyte formation and overlies the Lake Louise shale in its type section on Mount St. Piran. May be represented by the Mahto sandstones in the Robson Peak district. Fauna includes annelid trails and borings, Hyolithes sp., fragments of Olenellus cf., O. canadensis Walcott, and small trilobites.

References:

Deiss, C. (1939), Cambrian Formations of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Amer. Bull., Vol. 50, pp. 997-998.

Deiss, C. (1940), Lower and Middle Cambrian of Southwestern Alberta and Southeastern British Columbia, Geol. Soc. Amer. Bull., Vol. 51, pp. 750-751, and 755.

Fox, F.G. (1953), Glossary of Formation Names of Southwestern Alberta, Alberta Soc. Petrol. Geol, Third Ann. Field Confer. and Symp., Guide Book, p. 186.

Walcott, C.D. (1928), Cambrian Geology and Paleontology, No. 5: Pre-Devonian Paleozoic Formations of the Cordilleran Provinces of Canada, Smithsonian Misc. Coll., Vol. 75, No. 5, pp. 252-253, 280, 298, 301, 308.

Prepared by: R. A. Briggeman, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

SAWTOOTH: Middle Jurassic

Author: Cobban, W. A., 1945, Marine Jurassic Formations of Sweetgrass Arch, Montana, Bull. Amer. Assoc. Petrol. Geol., Vol. 29, No. 9, pp. 1262-1303.

Locality: Rierdon Gulch, Sec. 23, Twp. 24 N, Rge. 9 W, Montana, Teton County, Montana.

Lithologic Characteristics: In Alberta the Sawtooth consists of the Belemnite Conglomerate at the top, a thin, green fossiliferous shaly sand or sandy shale member with scattered chert nodules. Underlying this is a fine to medium grained well sorted, white quartz sandstone member. Beneath the sandstone is a 12-14 foot dark green calcareous shale member. At the base is found 15-20 feet of fine grained grey to greenish grey quartzose sand.

Thickness and Distribution: The thickness of the Sawtooth is determined by the topography of the Mississippian and hence varies considerably. Generally, sandstone members are not found west of a line from Coutts to the Little Bow River. The northern extent (the eroded edge) of the Sawtooth generally follows the trend of the Oldman and South Saskatchewan Rivers eastward from the Little Bow, passing north of Medicine Hat and Many Islands Lake.

Relation to other Units: The Sawtooth is the oldest Jurassic member in Alberta and overlies the eroded Mississippian unconformably and is overlain by the Rierdon.

References:

Weir, J. D., 1949, Marine Jurassic Formations of Southern Alberta Plains, Bull. Amer. Assoc. Petrol. Geol., Vol. 33, No. 4, pp. 547-563.

Prepared by: Sun Oil Company, Calgary, July 1954.

SHAFTESBURY FORMATION: Fort St. John Group, Lower Cretaceous

Author: McLearn and Henderson (1944), Geology and Oil Prospects of the Lone Mountain Area, British Columbia, B.C., p. 3.

Locality: Lower Peace River, British Columbia.

History: Fort St. John shale originally used by Dawson (1880) applied to dark shales below the Dunvegan formation. Base defined by McConnell (1893) as shales between Peace River sandstones and Dunvegan formation. McLearn (1917) shortened name to "St. John" and used in the same manner as McConnell. Wickenden and Shaw (1943) raised Fort St. John to group rock. McLearn and Henderson (1944) introduced Shaftesbury for shales formerly called Fort St. John and St. John.

Lithologic Characteristics: McLearn (1917) describes the formation as a sequence of dark blue to grey friable marine shales with occasional rounded or banded ironstone concretions.

Thickness and Distribution: At type section 70 feet is exposed but it is estimated that at least 560 feet, is present. In the Cache Creek area 1,300 feet has been measured.

Relation to other Units: The contacts with the overlying Dunvegan formation and the underlying Peace River formation are conformable and gradational. The Shaftesbury is equivalent to the crusier. Goodrich, and Hasler formations to the west on the Upper Pine River and is equivalent, in part, to the lower Blackstone where the Dunvegan pinches out to the southeast. Wickenden and Shaw (1943) show a direct correlation with the "Dark Marine Shale" of the Lone Mountain area, British Columbia.

Palaeontology: The Fish scale zone is a prominent horizon within the Shaftesbury. The following fossils have been identified from the formation: Neogastroplites, Posidonomya, Nahawisi and Inoceramus cadottensis.

References:

Dawson (1880), Geol. Surv. Canada Rept. on Progress Pt. B., pp. 99-136.
Nielsen, A. R., A Microfaunal Study of the Shaftesbury Formation, Unpublished Masters Thesis University of Alberta.
McLearn, F. H. (1917), Peace River Section Alberta, Geol. Surv. Canada, Summary Rept. 1917, Part C.
Irish, E.J.W. (1952), Copton Creek Map Area, Paper 52-7.
Wickenden & Shaw (1943), Stratigraphy and Structure in Mt. Hulcross-Commotion Creek Map Area, B.C., Geol. Surv. Canada, Preliminary Paper 43-13.
McLearn and Kindle (1950), Geology of Northeastern British Columbia, Geol. Surv. Canada, Memoir 259.
McConnell, R. G. (1893), Report on a Portion of the District of Athabaska Comprising the Country between Peace River and Athabaska River North of Lesser Slave Lake, Geol. Sur. Can., Vol. 5, Pt. D.

Prepared by: Canadian Gulf Oil Company, Calgary, July 1954.

SHANDRO SHALE: Belly River Formation, Upper Cretaceous

Author: Allan, J. A. (1918), Sections along North Saskatchewan River and Red Deer and South Saskatchewan, Canada Geological Survey Summary Report, 1917, Pt. C., p. 12, and fig. 2.

Locality: "These shales are exposed along the water level below the mouth of Whitemud Creek (Twp. 58, Rge. 15 W4.)"

Lithologic Characteristics: " . . . . a thin series of dark grey marine shales containing calcareous and arenaceous concretions. . . . . Fragments of Inoceramus, Scaphites and possible Placenticeras were found in the calcareous concretions." Shaw and Harding add that it "contains carbonaceous shales and brownish gray, silty shale with carbonaceous specks."

Thickness and Distribution: Allan states that the Shandro shale does not exceed 70 feet in the outcrop and Shaw and Harding state that it varies from 1 to 85 feet in the subsurface.

Relation to other Units: Allan correlated the Shandro with the Grizzly Bear formation, but Shaw and Harding consider it lower in the section, below the Victoria member. Allan gave no greater extent than the outcrop area but Shaw and Harding trace the western limit from Twp. 26, Rge. 6 W4 to Twp. 59, Rge. 19 W4. To the east it merges into the Lea Park formation. Overlain by the Victoria sandstone and underlain by the Brosseau member.

References:

Shaw, E. W. and Harding, S.R.L. (1954), Lea Park and Belly River Formations of East-Central Alberta. Western Canada Sedimentary Basin, Amer. Assoc. Petrol. Geol. Symposium, pp. 297-308.

Nauss, A. W. (1945), Cretaceous Stratigraphy of Vermilion Area, Alberta, Canada, Bulletin A.A.P.G., Vol. 29, pp. 1605-29.

Slipper, S. E. (1918), Viking Gas Field, Central Alberta, Geol. Survey Canada Summary Rept., 1917, pt. C., pp. 9-13.

Prepared by: R. H. Erickson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

SHEPPARD FORMATION: Precambrian, Purcell Series. Clarke Range of Alberta and Montana.

Author: Willis, Bailey (1902), Stratigraphy and Structure of the Lewis and Livingstone Ranges, Montana; Bull. Geol. Soc. Amer., Vol. 13 p. 324.

Locality: Near Sheppard Glacier, Montana.

Lithologic Characteristics: (Daly, 1912) "Its colour, compactness, and general habit are those of an impure flaggy quartzite. The thin section shows that the rock is largely composed of carbonate (dolomite) and that quartz occurs as minute grains rather evenly distributed through the mass of carbonate. The staple rock of the Sheppard is, thus, in the boundary belt and probably also further south, a siliceous dolomite or dolomitic quartzite. More typical quartzite occurs as a subordinate constituent of the formation...."

Near the base a 35 foot sill of lava appears in the western sections.

Thickness and Distribution: Thickness at the type locality 700 feet, estimated; at Waterton 600 feet. It occurs throughout the Clarke Range of southwestern Alberta and northwestern Montana. It is not known anywhere else in Alberta.

Relation to Other Units: Succeeds the Purcell conformably; overlain conformably by the Kintla formation.

Reference:

Daly, R.A. (1912), Geology of the North American Cordillera at the Forty Ninth Parallel; Geol. Surv. Canada, Memoir 88, pp. 77-81.

Prepared by: F. G. Fox, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

SIMPSON SHALE: Upper Devonian

Author: Whittaker, E. J., 1922, Geological Survey of Canada, Summary Report, 1921, Part B.

Williams, M. Y., 1922, Geological Survey of Canada, Summary Report, 1921, Part B.

Locality: At the junction of the Liard and MacKenzie Rivers, Northwest Territories.

Lithology: Soft clay-shale of greenish grey or bluish grey color, containing ironstone concretions.

Thickness and Distribution: The name "Simpson Shale" was given to over 650 feet of shale exposed in the vicinity of Fort Simpson and Ebbott hills, N.W.T.

Relation to other Units: The Simpson shale is overlain by the Hay River limestone and underlain by the Slave Point limestone. These shales are believed to be equivalent, in part at least to the Hay River shales, exposed on Hay River, and to the Woodbend formation of the central and northern Alberta areas.

Prepared by: W. I. Wright, Socony-Vacuum Exploration Co., Calgary, July 1954.

SIYEH FORMATION: Precambrian, Purcell Series. Clarke Range of Montana and Alberta; Purcell Range of British Columbia.

Author: Willis, Bailey (1902), Stratigraphy and Structure of the Lewis and Livingstone Ranges, Montana; Bull. Geol. Soc. Amer., Vol. 13, p. 323.

Locality: Mount Siyeh, Glacier National Park, Montana.

Lithologic Characteristics: The lower part (500 feet) comprises pale green argillite with some buff weathering, laminated, or arenaceous dolomite; the middle part (900 feet) consists of mixed dolomite and limestone, some with "molar-tooth" structure, some with algal structures, and thin intercalations of black argillite; the upper part (600 feet) includes mainly green argillites but with three bands of red argillite, of which the uppermost marks the top of the formation. Rain prints, sun cracks, and ripple marks are common in the upper part.

Daly commented that the Siyeh is a great cliff maker in the front ranges. He also mentions two gabbroid sills in the formation, 40 to 50 feet thick, and occurring 1200 and 3000 feet below the top.

Thickness and Distribution: In the type section on Mount Siyeh about 4,000 feet; in Waterton area 2,000 to 3,000 feet. The formation outcrops widely in the Lewis Overthrust sheet of Alberta and Montana, and in the Purcell Range of British Columbia. It is not known elsewhere in Alberta.

Relation to Other Units: Succeeds the Grinnell formation conformably; overlain conformably by the Purcell Lava.

References:

Clapp, C.H. (1932), Geology of a Portion of the Rocky Mountains of Northwestern Montana; Montana Bur. Mines and Geology, Memoir No. 4.

Daly, R.A. (1912), Geology of the North American Cordillera at the Forty Ninth Parallel; Geol. Surv. Canada, Memoir 88, pp. 72-77.

Douglas, R.J.W. (1952), Waterton, Alberta; Geol. Surv. Canada, Paper 52-10.

Prepared by: F. G. Fox, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

SOLOMON SANDSTONE: member of the Wapiabi formation, Upper Cretaceous.

Author: The name is believed to have been first used in private reports by geologists working in the foothills in the Athabaska river area. The name appears to have been introduced first into published literature by A. H. Lang.

Locality: The member probably received its name from Solomon creek which flows into the Athabaska river near Solomon which is a railway siding on the Canadian National Railway.

Lithologic Characteristics: According to Irish (1951) the member consists of a distinctive hard, grey to greenish grey, buff weathering, slabby sandstone.

Thickness and Distribution: Thicknesses of 87 and 95 feet have been recorded by Lang, whereas Irish has indicated a thickness ranging from 80 to 100 feet for this member. The member has a wide distribution throughout the Foothills in Alberta and its equivalents are recognized over a broad Plains area as well.

Relation to other Units: Both Lang and Irish have included the Solomon sandstone in the base of the Brazeau formation but because of the marine character of the beds, this member should be included within the Upper part of the Wapiabi formation. The member is correlated with a part of the transitional zone between the Wapiabi and Brazeau formations referred to by McKay, a part of the Brazeau - Pierre formation of Sanderson, the Chinook member of the Peace River area and the Milk River and Highwood sands of Southern Alberta.

References:

Lang, A. H., 1945, Entrance Map - Area, Geological Survey Paper 45-11.
Irish, E.J.W., 1951, Pierre Greys Lakes Map Area, Alberta Geological Surv. Can. Mem. 258.
Sanderson, J.O.G., 1939, Geology of the Brazeau Area, Trans. C.I.M. & M. August.
Gleddie, J., 1949, Upper Cretaceous in Western Peace River Plains, Alberta, A.A.P.G. Vol. 33, No. 4, April.
McKay, B. R., 1943, Foothills Belt of Central Alberta, Geol. Surv. Can. Preliminary Map 43-3.

Prepared by: Joseph Gleddie, Imperial Oil Limited, Calgary, July 1954.

SPARKY SAND: Manville Formation, Lower Cretaceous

Author: Charles Mills, driller at Sparky No. 1, named sand after Winnipeg business associate. A popular name used locally in the Lloydminster field. Nomenclature committee of A.S.P.G. approved its use and it appeared in J. Humphrey's chart, published by Petroleum and Natural Gas Conservation Board, of Lloydminster type well log, December, 1947.

Locality: Sparky No. 1, Lloydminster field.

Lithologic Characteristics: Oil sand, unconsolidated, well sorted, rounded pure quartz, average grain size 0.15 mm. Commonly associated with pyrite nodules and grey shale with some plant fragments.

Thickness and Distribution: Sand and associated shale is approximately 40 feet thick in the Lloydminster area. See also Wainwright, Vermilion and Borradaile sands.

Relation to other Units: Second sand of Blairmore or Manville in Lloydminster area, underlying Colony sand.

Prepared by: D. M. Lorenger, Imperial Oil Limited, Calgary, July 1954.

SPIRIT RIVER FORMATION: Lower Cretaceous

Author: Lower Cretaceous Study Group, L. E. Workman, Chairman, Alberta Society of Petroleum Geologists, paper distributed by courtesy of the Canadian Stratigraphic Service Ltd., Calgary, Alberta. (1952)

Locality: The name was recommended by P. C. Badgley in a report which was not published until after the paper by the Lower Cretaceous Study Group. The formation received its name from the Imperial Spirit River #1 well located in Lsd. 12, Sec. 20, Twp. 78, Rge. 6 W6 M. In this well it was penetrated between depths from 2678 feet to 3810 feet.

Lithologic Characteristics: The formation includes the sandstones and shales lying between depths of 2678 feet to 3810 feet in Imperial Spirit River No. 1. This interval was completely cored and the recovery was between 45 and 50%.

Thickness and Distribution: The Spirit River formation consists of the following members (the thicknesses given are those encountered in Imperial Spirit River No. 1):

Strata	Thickness	Depth in feet
Base Peace River formation		2678
Spirit River formation		
Notikewin member	92	2770
Falher member	680	3450
Wilrich member	360	3810
Total thickness Spirit River fm.	1132	

The Lower Cretaceous Study Group recognizes the formation as occurring in subsurface throughout an area extending from the British Columbia - Alberta boundary as far east as the west end of Lesser Slave Lake and in a north - south direction from Twp. 96 to Twp. 73.

Relation to other Units: The top of the formation is marked by the fairly abrupt downward change from the Harmon shale (lowermost member Peace River formation) to sandstone and the bottom by a similar fairly abrupt downward change from shale to the sandstone of the underlying Bluesky formation.

References:

Badgley, Peter C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geol. Survey of Canada, paper 52-11.

Prepared by: Joseph Gleddie, Imperial Oil Limited, Calgary, July 1954.

SPRAY RIVER FORMATION: Triassic

Author: Kindle, E. M., (1924), Standard Paleozoic Section of Rocky Mountains near Banff, Alberta, Pan-American Geologist, Vol. XLII, pp. 113-124.

Locality: On the Spray River near Banff, Alberta.

Lithologic Characteristics: The formation consists essentially of calcareous or dolomitic shales and argillaceous limestones and dolomites. The rocks are generally dark grey to black and many are finely banded. The banding is due to alternating layers of dark, argillaceous material and light grey dolomite or limestone. Beds of nodular limestone occur in places in the banded calcareous shales near the bottom of the formation. Beds of pure grade limestones, dolomites and magnesian limestones of a coarser texture occur at irregular intervals throughout the formation.

Thickness: The thickness of the formation ranges from approximately 1500 to 2400 feet.

Relation to other Units: The Spray River formation at its type section is underlain by the Rocky Mountain quartzite (Pennsylvanian) and overlain by the Fernie formation.

References:

Warren, P. S. (1927), Banff Area, Alberta, Geol. Surv. Canada, Mem. 153.
Lang, A. H. (1947), Brule and Entrance Map Areas. Geol. Surv., Canada, Mem. 244.
McLearn, F. H. (1945), The Lower Triassic of Liard River, British Columbia, Geol. Surv. Canada, Paper 45-28.

Prepared by: V. B. Coombs, Texaco Exploration Co., Calgary, July 1954.

ST. MARY RIVER FORMATION: Brazeau (Montana) Group, Upper Cretaceous, Southwest Alberta and North Central Montana

Author: Dawson, G. M., and McConnell, R. G. (1884), Report on the Region in the Vicinity of the Bow and Belly Rivers, Northwest Territory, Geol. & Nat. Hist. Sur. of Canada, Rept. of Progress, 1882-83-84, Pt. C, pp. 58-59, 114.

Locality: Along St. Mary River west of Magrath, exposures for 20 miles. Outcrops for 12 miles along Old Man River westward from the road bridge south of Monarch. Typical exposure on North bank St. Mary River, Sec. 9, Twp. 5, Rge. 23 W4.

Lithologic Characteristics: Alternating series of hard grey calcareous sandstones with soft grey brown and greenish sands, shales and sandy shales. Beds are lenticular. Thin lignite beds near base. Fossiliferous. Continental deposits.

Thickness and Distribution: 1500-1600' on Oldman River, thickening westward in Foothills to 2700'. Present in southwestern Alberta, north-western Montana west of Sweetgrass arch. Stratigraphic equivalent of Edmonton formation in Alberta and Lance Formation in Montana.

Relation to other Units: Rests on Blood Reserve (Fox Hills ss.) formation. Overlain by Willow Creek formation - a series of reddish and purplish clay beds, with grey and yellow sandstones.

References:

Russell, L. S. and Landes, R. W., 1940, Memoir 221, Coal Survey of Canada, pp. 84-86.

Williams, M. Y. and Dyer, W. S., 1930, Memoir 163, Geological Survey of Canada, pp. 52-56.

Russell, L. S., 1931, Summary Report, Geological Survey of Canada, Pt. B, p. 34.

Williams, E. P. (1951), St. Mary River Formation in Spring Coulee - Magrath Area, Alberta, Canada, Bull. Am. Assoc. Petrol. Geol., Vol. 35, No. 4, pp. 885-898.

Prepared by: Link, Downing and Cooke Ltd., Calgary, July 1954.

STOCKMANS SAND: Local sand of the Blairmore Formation, Lower Cretaceous

Author: Unknown. The sand was named after the well Stockman #1 in Lsd. 1 of Sec. 27, Twp. 20, Rge. 3, W5 at Turner Valley.

Remarks: The sand is reported to be present in a few wells drilled in Township 20, Range 3, W5 and Township 19, Range 2 W5. It is recognized only locally as occurring about 100 feet below the top of the Blairmore. Contains gas in the well for which it was named.

Prepared by: Link, Downing and Cooke Ltd., Calgary, July 1954.

SULPHUR MOUNTAIN MEMBER: Spray River formation, Triassic

Author: Warren, P. S. (1945) Triassic Faunas in the Canadian Rockies, Am. Jour. Sci., Vol. 243, pp. 480-491.

Locality: Sulphur Mountain near Banff, Alberta.

Lithologic Characteristics: Light grey, grey, dark grey and black dolomitic limestone and thin bedded medium grained and fine grained dolomitic shale.

Thickness: The thickness of this unit at the type section is 1243 feet.

Relation to other Units: The formation rests on the Rocky Mountain formation and is overlain by the Whitehorse member of the Spray River formation.

References:

Lang, A. H. (1947), Brule and Entrance Map Areas Alberta, Geol. Surv. Canada, Mem. 244.

McLearn, F. H. (1945), The Lower Triassic of Liard River, British Columbia, Geol. Surv. Canada, Paper 45-28.

Prepared by: V. B. Coombs, Texaco Exploration Co., Calgary, July 1954.

SUNBURST SAND: Kootenai (Blairmore) Formation, Lower Cretaceous

Author: A committee composed of representatives of operators in the Cut Bank Oil and Gas Field, Montana.

Locality: Type locality is Cut Bank Field, Montana.

Lithologic Characteristics: Grey sandy shale, dense silty sandstone, dark grey carbonaceous shales, lenticular fine grained porous quartz sandstones with a variable thickness of soft variegated mudstone (maroon or red, green and yellow) at the base. Locally the sandstone may be absent or the entire zone may be sandstone.

Thickness and Distribution: Fifty feet (50') thick at its type section in the Cut Bank Field, Montana. When the overlying Moulton Zone is included it has a thickness of 150 feet. It is present in Northwestern Montana and Southwestern Alberta usually west of the Sweetgrass arch. Outcrops of this zone have not been found.

Relation to other Units: Rests on the Upper Cut Bank Sand and is overlain by the Moulton Zone. The U. S. Geological Survey designates the Moulton Zone as the Upper Sunburst sand. The Moulton Zone is overlain by the shales of the Upper Kootenai or Blairmore.

Remarks: The main productive sand is known as the Lander Sand at the top of the Sunburst. The remainder has produced some natural gas but very little crude oil. There is difficulty in distinguishing between the Sunburst and the Cut Bank if the basal Sunburst mudstone is absent.

References:

Blixt, John E., The Cut Bank Oil and Gas Field, Glacier County, Montana, A.A.P.G. Symposium, Stratigraphic Type Oil Fields. pp. 338-345.

Prepared by: Link, Downing and Cooke Ltd., Calgary, July 1954.

SWIFT FORMATION: Ellis Group, Upper Jurassic, Oxfordian

Author: Cobban, W. A. 1945, Marine Jurassic Formations of Sweetgrass Arch, Montana, Amer. Assoc. Petrol. Geol. Bull. Volume 29, No. 9, pp. 1281-1286.

Locality: Swift Reservoir, Birch Creek, Section 27, Twp. 28 N, Rge. 10 W, Montana.

Lithologic Characteristics: At type locality, the Swift consists of two members; the lower is a dark grey non-calcareous shale 54 feet thick; upper is flaggy 80-foot sandstone containing shale partings. Elsewhere a basal conglomerate is present, or the two members may consist of massive fine grained sandstone with shale partings.

Thickness and Distribution: 135 feet at type section. Zero line circles Sweetgrass arch, angles northeast across southeast corner Alberta, east across Saskatchewan into Manitoba. Formation reaches 166 feet at Pondera field, thins gradually north and east to line of erosional truncation.

Relation to other Units: Rests conformably on Rierdon shales; also found overlying Sawtooth or truncated Paleozoic sediments unconformably. Overlain conformably by Upper Jurassic (Morrison), or unconformably by Basal Cretaceous Sunburst or Cutbank sands.

References:

Weir, J. D., 1949, Bull. Amer. Assoc. Petrol. Geol., Volume 33, No. 4 p. 552.

Prepared by: L. L. Bell, Stanolind Oil & Gas Co., Calgary, June 1954.

SWIFT CURRENT FORMATION: Tertiary, probably Eocene.

Locality: Believed to be exposed in Wood Mountain country of Saskatchewan.

Lithologic Characteristics: Thin conglomerate of coarse chert and quartzites, consisting of grey buff chert pebbles and cream colored clay pellets, and some fine grained concretionary sandstone. Apparently barren of fossils. Believed to be non-marine.

Distribution: Believed to be confined to south-west Saskatchewan.

Relation to other Units: Lies on top of the Fort Union. Possibly correlative to the Wasatch formation of N. Dakota and Montana.

Reference:
Verbal communication with Phil Brennan, Socony-Vacuum, Calgary.

Prepared by: Robert Schwab, Merrill Petroleums Limited, Calgary, July 1954.

TABER SAND: Basal Cretaceous

Locality: Type section from the discovery well of the East Taber field in Lsd. 9, Sec. 18, Twp. 9, Rge. 16 W4, some 30 miles east-northeast of Lethbridge. This is a subsurface type section only; no outcrops of the Taber sand exist.

Lithology: Medium to coarse grained, angular, clear quartz and dark grey to black chert grains, in a non-calcareous often highly bentonitic or kaolinitic matrix; often becoming more cherty towards the base. The sand is locally interfingered with shale.

Thickness and Distribution: This is a local development of the Basal Cretaceous sand around the town of Taber, and embraces 4 small oil pools producing oil ranging from 17° API to 29° API. The sand is exceedingly lenticular and ranges from zero to a maximum of approximately sixty feet in thickness in the Taber fields.

Relation to other Units: Rests unconformably on the Rierdon shale and is overlain by the shales and sands of the Lower Cretaceous Blairmore formation, of which the Taber sand is the basal member. Probably correlative to the Cutbank sand.

References:

Keevil, A. R., (California Standard), 1948, paper presented to A.S.P.G., unpublished.

Prepared by: Robert Schwab, Merrill Petroleums Limited, Calgary, July 1954.

THELMA MEMBER: Bearpaw formation, Upper Cretaceous

Author: Furnival, G. M., 1950, Cypress Lake Map-Area, Saskatchewan, Geol. Surv. Canada, Mem. 242, pp. 42, 55, 72, 76.

Locality: Thelma Creek, Sec. 2, Twp. 7, Rge. 4 W4th Mer., Alberta.

Lithologic Characteristics: Sandstone, compacted, pale grey to white weathering, fine to medium grained, micaceous, feldspathic, light grey to brownish grey near base; thin laminae of fissile dark brown shale; bedding 8" thick. Loranger and Gleddie (1953) consider the Thelma member as falling within the lower part of their Gyroidina sp. zone. This basal portion of the zone is characterized in core holes by abundant Haplophragmoides and Radiolaria. These two forms are seldom found in association within the subject area and suggest unusual environmental conditions.

Thickness and Distribution: 40 feet thick on Thelma Creek, Alberta, and only 14 feet thick on Battle Creek, Saskatchewan.

Relation to other Units: According to Furnival, at the western side of the Cypress Lake map-area three sandstones occur in the upper 300 feet of the Bearpaw formation, and are either absent or very thin on the eastern side of the map area. These are in descending order the Thelma, the Belanger, and the Oxarart members. Lines (1947), in his composite section of surface beds on southwest side of the Cypress hills shows the Thelma overlain by the Medicine Lodge member and underlain by the Belanger member.

References:

Loranger, D. M. and Gleddie, J., 1953, Some Bearpaw Zones in Southwestern Saskatchewan and Southern Alberta, Alberta Society of Petroleum Geologists Field Conference & Symposium, p. 164.

Lines, F. G., Stratigraphy of the Bearpaw and Later Formations of the Alberta Plains, Unpublished, March 1947.

Prepared by: D. E. Campau, Canadian Stratigraphic Service Ltd., Calgary, July 1954.

THREE FORKS FORMATION: Upper Devonian

Author: Peale, A. C., 1893, The Paleozoic Section in the Vicinity of Three Forks, Montana, U.S. Geological Survey Bulletin 110.

Locality of Type Section: North of the Gallatin River at the town of Logan, Montana, Section 24, Township 2 N, Range 2 E, Gallatin County, Montana.

History: Peale applied the name Three Forks formation to the uppermost Devonian unit. Miscorrelation has led to the use of the name in northern Montana and southern Alberta for beds equivalent in time both to the Three Forks formation and the upper portion of the Jefferson dolomite of the type section.

Lithologic Characteristics: The type section consists of yellow-weathering calcareous sandstone and sandy limestone underlain by greenish plastic shale which in turn is underlain by dark brown dolomitic shale and shaly dolomite. This facies does not extend northward of an east-west line along the Little Belt - Big Snowy Mountains.

The term Three Forks formation has been generally applied in southern Alberta to an uppermost Devonian sequence of different lithology from the type section, composed of an upper Grassy Lake member consisting of grey, earthy limestone and grey-green non-calcareous shale, and a lower Potlatch member consisting of anhydrite and dolomite, with salt occurring locally.

Thickness and Distribution: 700 - 120 feet, thinning eastward toward Saskatchewan. Present in the subsurface throughout the plains of southern Alberta but truncated by pre-Cretaceous erosion toward the east-central part of the province.

Relation to other Units: Overlain by the Exshaw with suspected unconformity, and conformably overlies the Jefferson formation. It is the correlative of the Palliser formation of the Rockies, and grades laterally into the lithology of the Wabamun formation of the Edmonton area. The boundary between applicability of Three Forks and Wabamun terms would approximate the southern and eastern boundaries of the green shale basin.

References:

Sloss, L. I. and Laird, W. M., 1947, Devonian System in Central and Northwestern Montana, A.A.P.G. Bull. Vol. 31, No. 8, Pages 1404-1430, August, 1947.

Prepared by: D. O. Stewart, Socony-Vacuum Exploration Co., Calgary, July 1954.

TOVELL MEMBER: Mannville formation, Lower Cretaceous

Author: Nauss, Arthur W., 1945, Cretaceous Stratigraphy of Vermilion Area, Alberta, Canada, American Association of Petroleum Geologists Bulletin, Vol. 29, No. 11, pp. 1605-1629.

Locality: Northwest Mannville well #1, Lsd. 1, Sec. 18, Twp. 50, Rge. 8 W4, between depths 1833 and 2308.

Lithologic Characteristics: "This member consists largely of massive coarse 'salt and pepper' sandstone, gray shale with abundant plant remains, and some thin coal seams. ....., the Tovell sandstones have lower permeability (than other Mannville sands)."

Thickness and Distribution: The thickness of the Tovell member in its type section is 78 feet. Throughout the Vermilion area its thickness varies from 75 to 116 feet. The Vermilion area defined by Nauss is Twp. 43 to 57, Rge. 1 to 14, West Fourth Meridian.

Relation to other Units: "The Tovell member is underlain conformably by the Islay member and is overlain by the Borradaile member. It is differentiated from both of these by the abundance of dark minerals in its sands and its angular and poorly sorted sand grains.

Prepared by: R. H. Erickson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

TUNNEL MOUNTAIN MEMBER: Rocky Mountain Formation, "Permo-Pennsylvanian".

Author: Beales, F. W., 1950, The Late Paleozoic Formations of Southwestern Alberta, Canada Geo. Surv., Paper 50-27, p. 6.

History: The first use of the term Tunnel Mountain was made by H. H. Beach in a talk before the A.S.P.G. in the spring of 1947, to designate the uppermost of his three proposed divisions of the Mississippian Rundle Formation. Published recognition of the fact is made by Gallup (1951, p. 809) and Fox (1953, p. 197). Warren (1947) used the same term later in the year in an oral presentation to the Geological Society of America for the lower of his two subdivisions of the Rocky Mountain formation, which he considered Permo-Pennsylvanian in age. However, he did not publish the term in his abstract. Beales (1950, p. 6) made the first published reference to the term Tunnel Mountain, using it in Warren's sense and acknowledging his contribution, and presenting a detailed section of the type locality. Thus, he, rather than Beach or Warren, should properly be credited with authorship of the term.

Locality: South end of Tunnel Mountain, Banff, Alberta, approximately in Sec. 33, Twp. 25, Rge. 12 W. of the 5th Mer.

Lithologic Characteristics: At type locality the upper two thirds is sandstone and quartzite, medium grained, buff-weathering, with zones of chert and siliceous druse; this grades downward in lower third to similar strata with dolomite, fine to medium grained, light gray to buff-weathering, with highly cherty zones (From Beales', 1950, detailed section). Southward from the type area, the arenaceous content decreases rapidly in favor of carbonate and disseminated clay. (Personal observation, Raasch).

Thickness and Distribution: 376 feet at type locality. Extent in mountains needs to be checked by detailed studies. Absent in foothills and central and southern Alberta plains due to post-Paleozoic erosion.

Relation to other Units: Rests conformably on Rundle limestone (Mississippian) and overlain conformably by Mount Norquay member of the Rocky Mountain formation.

References:

Warren, P. S., 1947 (Dec.), Age and Subdivisions of the Rocky Mountain Formation at Banff, Alberta (Abstract), Geol. Soc. America Bull., Vol. 58, No. 12, Pt. 2, p. 1238, (name omitted from abstract, but mentioned in oral presentation).

Gallup, W. B., 1951, Geology of Turner Valley Oil and Gas Field, Alberta, Amer. Assoc. Petr. Geol. Bull., Vol. 35, No. 4, p. 809.

Fox, F. G., 1953, Glossary of Formation Names of Southwestern Alberta, Alberta Soc. Petr. Geol., Third Ann. Field Conf. and Symposium, p. 198.

Douglas, R.J.W., 1953, Carboniferous Stratigraphy in the Southern Foothills of Alberta, idem, pp. 68, 75, 76.

Prepared by: Mrs. A. Tharp, Trinidad Leaseholds (Canada) Ltd., and Gilbert Raasch, Canadian Stratigraphic Service, Ltd., Calgary, July - Aug. 1954.

VANALTA SAND: Occurs at the base of the continental Kootenai formation of Northern Montana (equivalent to the Blairmore formation of Southern Alberta), Lower Cretaceous.

Author: Vanalta sand was named after its discovery well Vanalta Oils Ltd. Red Coulee No. 1, in September 1929.

Locality: Red Coulee Oil field located north and south of the International Boundary in the province of Alberta and the state of Montana approximately five miles west of Coutts, Alberta. The producing area lies within Sections 3 and 4, Township 1, Range 16 west 4th Meridian, Alberta; and in Montana within Sections 1 and 2, Township 37 N, Range 4 W.

History: After its discovery, deeper drilling revealed a still lower productive horizon which was named the Cosmos sand. The U.S.G.S. uses the name Cosmos for the undivided basal sandstone of the Kootenai formation. Over the productive part of the field it is split by a wedge of gray-green pyritic siltstone which thickens toward the north and east. The upper eastward-extending sandstone tongue is locally termed the Vanalta sand (Upper Cosmos) and the lower member the Lower Cosmos sand. A cross section Fig. 3 on page 289 of "Stratigraphic Type Oil Fields", 1941, illustrates this relationship.

Canadian students of the Border Red Coulee field have used different systems of nomenclature. The Vanalta sand has not been applied to the same stratigraphic unit, thus creating confusion. The name Vanalta sand was used during the period when there was still much confusion as to the subsurface correlation, and has been assigned to apply to the Canadian part of the field.

Lithologic Characteristics: The Vanalta sand consists of fine to medium grained light gray quartz sand with a trace of gray and black chert. Some portions exhibit fine laminae of black shale and others may be cross bedded. In places the sand is impregnated with a black bituminous substance with high luster which contains many minute stringers of pyrite. Irregular occurrence of a clay matrix has produced irregular porosity traps.

Thickness and Distribution: The sand varies in thickness from 5 to 15 feet and is present only over the producing area of the field.

Relation to other Units: The Vanalta sand is overlain in the Border Red Coulee field by 40 to 80 feet of variegated mudstone and minor amounts of sandstone. Underlying the Vanalta (Upper Cosmos) sand is a 10 to 15 foot wedge of gray-green pyritic siltstone which separates it from the lower Cosmos sand.

References:

Erdman, C. E. and Schwabrow, J. R., 1941, Border Red Coulee Field, "Stratigraphic Type Oil Fields," A.A.P.G., pp. 292-320.

Dobbin, C. E. and Erdman, C. E., 1934, Oil and Gas in Montana "Problems of Petroleum Geology,"page 711.

Yarwood, W. S., 1931, Stratigraphy of Red Coulee Oil Field, A.A.P.G. Bull., Vol. XV, p. 1109.

Evans, C. S., 1930, Milk River Area and Red Coulee Oil Field, Alberta, Can. Geol. Sur. Summary Report (1930), Part B, pp. 1B-30B.

Prepared by: A. N. Bahan, The Ohio Oil Company, Calgary, July 1954.

VANESTI TONGUE: Lea Park formation, Upper Cretaceous

Author: Nauss, Arthur W., (1945), Cretaceous Stratigraphy of Vermilion area, Alberta, Canada, American Association of Petroleum Geologists Bulletin, Vol. 29, No. 11, pp. 1605-1629.

Locality: "The type section . . . . comprises two outcrops. One outcrop is on the spur which divides Battle River Valley from Grizzly Bear Coulee near the junction of the two, in Lsd. 8, Sec. 35, Twp. 47, Rge. 5 W4. The other outcrop is on a spur in Lsd. 14, Sec. 25, Twp. 47, Rge. 5 W4.

Lithologic Characteristics: Grey shale and silty shale grading upward to silt and fine sand at the top. The lower 60' is clay shale with conchoidal fracture.

Thickness and Distribution: Average thickness is about 100'. "The tongue has been encountered north and west of Vermilion. It occure in Northwest Tovell Well No. 1, between depths of 16 and 108 feet. It outcrops on the north bank of the Vermilion River Valley in Lsd. 4, Sec. 34, Twp. 50, Rge. 8 W4. On the Innisfree sheet (Home and Hage, 1941) the window on Vermilion River mapped as Lea Park shale is part of the Vanesti tongue."

Relation to other Units: "The basal contact of the Vanesti tongue is placed at the top of a fairly persistent coal seam which was cored in the Battleview Syndicate Core Tests Nos. 3, 4, 5 and 6A. The upper contact of the tongue is gradational and is placed at the base of the sand of the upper Ribstone Creek." " . . . . projects into the upper part of the Ribstone Creek." The Vanesti tongue projects westward from the marine Lea Park shale into the continental Belly River formation.

References:

Hume, G. S. (1936), Preliminary Report, Battleview Anticline, Wainwright Area, Canada Geological Survey, Paper 36-10, pp. 1-17, map.

Hume, G. S. and Hage, C. O. (1941), The Geology of East Central Alberta, Canada Geol. Survey, Mem. 232, pp. 1-101.

Shaw, E. W. and Harding, S.R.L. (1954), Lea Park and Belly River Formations of East Central Alberta. Western Canada Sedimentary Basin, Amer. Assoc. Petrol. Geol. Symposium, pp. 297-308.

Prepared by: R. H. Erickson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

VERDIGRIS SANDSTONE MEMBER: Foremost formation, Montana group, Campanian stage, Upper Cretaceous series

Author: Slipper, S. E. and Hunter, H. M., 1931, Stratigraphy of Foremost, Pakowki and Milk River formations of the Southern Plains of Alberta, Amer. Assoc. of Petrol. Geol. Bull., Vol. 15, p. 1186.

Locality: No specific type section was designated; rather the authors named the member the Verdigris sandstone as "it is best exposed at three localities in the Coulee of that name". Verdigris Coulee is located northwest of the town of Milk River, Alberta.

Lithologic Characteristics: A buff weathering, light grey, medium-grained, massive, "salt and pepper" sandstone.

Thickness and Distribution: The Verdigris sandstone is the basal Foremost sandstone present in southern Alberta. Slipper and Hunter called the member the most persistent one of the Foremost although the thickness is variable from zero to sixty feet. Generally the member thickens south and southwest from the type locality. To the north, the sandstone is absent at Lethbridge and the South Saskatchewan River west of Medicine Hat.

The Verdigris sandstone is the basal sand member of the regressive brackish water Foremost formation. Since the basal sandstone has a variable age, and is discontinuous, the name Verdigris should possibly be restricted to this local area.

Relation to other Units: The sandstone grades downward into the dark brown marine Pakowki shales and is overlain by the McKay coal horizon of the Foremost formation.

References:

Crockford, M.B.B., 1949, Oldman and Foremost Formations of Southern Alberta, Amer. Assoc. of Petrol. Geol. Bull., Vol. 33, pp. 500-510.

Powers, D. L., 1931, Subsurface Study of Pale Beds and Foremost Formation in Lethbridge and Brooks Area of Southern Alberta, Amer. Assoc. Petrol. Geol. Bull., Vol. 15, pp. 1197-1213.

Russell, L. S. and Landes, R. W., 1940, Geology of the Southern Alberta Plains, Geol. Surv. of Can. Memoir 211, pp. 45-61.

Prepared by: E. W. Best, The Ohio Oil Co., Calgary, June 1954.

VIRGELLE SANDSTONE: Montana group, Upper Cretaceous

Author: Stebinger, E., 1914, U.S.G.S.P.P. 90, pp. 62-68.

Locality: Well exposed along the Missouri River eastward from the town of Virgelle, Township 26N, Rge. 11E, Chouteau County, Montana. Good exposures also occur in the vicinity of the Kevin Sunburst field and around the West Butte of the Sweetgrass Hills. In Southern Alberta good outcrop sections may be seen near Police Coulee, Sec. 35, Twp. 1, Rge. 13 W4. Other good sections occur in Davis Coulee, SE¼ Sec. 18, Twp. 1, Rge. 12 W4.

Lithologic Characteristics: Grey to buff, medium to coarse grained massive sandstone, highly crossbedded, and containing many ferruginous concretions in the upper half. In the lower half it is slabby grey sandstone becoming shaly toward the base.

Thickness and Distribution: The sand is approximately 220 feet thick near the town of Virgelle and reaches a maximum of about 250 feet around the Sweetgrass Hills. The zero limits of sand deposition follow a line drawn from the southern end of the Turner Valley field southeastward to Medicine Hat and continuing southerly through the Cypress Hills and the Little Rocky Mountains.

Relation to other Units: Equivalent to lower Milk River sandstone of Southern Alberta. Overlain by upper Eagle shales and sandstones in central Montana and by the upper Milk River sandstones in southern Alberta. In central Montana it is underlain by about 350 feet of transition beds known as the Telegraph Creek formation and in Southern Alberta it is transitional to the underlying Colorado shale.

References:

Geology of Natural Gas, 1935, A.A.P.G., pp. 248, 263, 264, 273.

Lexicon of Geologic Names of the United States, 1938, Geological Survey Bulletin 896, Part II, p. 2253.

Perry, E. S., 1953, Oil and Gas in Montana, Montana Bureau of Mines and Geology. Mem. 35, p. 8.

Russel, L. S. and Landes, R. W., 1940, Geology of the Southern Alberta Plains, G.S.C. Mem. 221, pp. 27-29.

Slipper, S. E. and Hunter, H. M., 1931, Foremost, Pakowki and Milk River Beds, A.A.P.G. Vol. 15, No. 10, pp. 1191-1196.

Williams, M. Y. and Dyer, W. S., 1930, Geology of Southern Alberta and Southwestern Saskatchewan, G.S.C. Mem. 163, p. 13.

Prepared by: George Mustard, The Ohio Oil Co., Calgary, June 1954.

WABISKAW MEMBER: Clearwater formation, Mannville group, Lower Cretaceous

Author: Badgley, C. Peter, 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, Geological Survey of Canada, Paper 52-11, p. 6.

Locality: Barnsdall West Wabiskaw No. 1 Well in Lsd. 11, Sec. 17, Twp. 78, Rge. 2 W5, Alberta.

Lithologic Characteristics: Massive sandstone unit, predominantly marine; sandstones are typically winnowed greywackes, moderately to highly glauconitic, generally well sorted, porous and permeable.

Relation to other Units: The member is correlated lithologically with the Islay member of eastern Alberta and with the so-called 'glauconitic sandstone' of the Leduc-Stettler areas. The Islay member is thought to be less marine in character than the Wabiskaw member.

Prepared by: J. S. Crewson, Great Plains Development Company of Canada, Ltd., Calgary, July 1954.

WAINWRIGHT SAND: Blairmore formation, Lower Cretaceous

Author: Hume, G. S., 1943, G.S.C. Paper 44-1, pp. 4-5.

Locality: From well logs, the main producing zone in the Wainwright field in Township 45, Range 6 west of 4th Meridian, four miles north of the town of Wainwright, Alberta.

Lithologic Characteristics: The oil sand is a light gray, fine-grained, soft sandstone, usually quartzose.

Thickness and Distribution: The sand varies from 5 to 15 feet in thickness in the Wainwright producing area, and is one sand except in one well in which it was reported to have been in two parts. The sand apparently is limited to the Wainwright area, but a sand in a similar position below the top of the Lower Cretaceous is found in the Ribstone area.

Relation to other Units: The Lower Cretaceous above and below the sand consists of sandstones with bentonitic and carbonaceous shales. Probably correlates with Sparky and Borradaile sands.

References:

G. S. Hume and C. O. Hage, The Geology of East Central Alberta, G.S.C. Memoir 232, 1941, pp. 55-64.

G. S. Hume, Seismic Surveys and Their Relation to Oil Prospects in Wainwright Area, Alberta. G.S.C. Paper 44-1, page 4.

Prepared by: Thomas Read, The Ohio Oil Company, Calgary, July 1954.

Note: Though the term Blairmore here is given formational status, McLearn in 1945 in his "Revision of the Lower Cretaceous of the Western Interior of Canada" (Second Edition), Paper #44-17, referred to the Blairmore as a group.

WATERTON FORMATION: Precambrian, Purcell Series. Exposed only in the Lewis Overthrust sheet, mainly in the immediate vicinity of Waterton National Park.

Author: Daly, R.A. (1912), Geology of the North American Cordillera at the Forty Ninth Parallel; Geol. Surv. Canada, Memoir 88, pp. 50-56.

Locality: Daly gave the name to the lowest exposed beds at Cameron Falls, at Waterton Lakes, Alberta.

Lithologic Characteristics: At bottom, banded and laminated grey limestone (15 feet); massive greenish dolomite (35 feet); green argillite (37 feet); buff-weathering cherty grey dolomite with thin grey argillite bands (100 feet); banded and streaked grey limestone and dolomite with grey argillite, algal colonies (105 feet); massive greenish dolomite (95 feet); grey limestone, dolomite and black argillite (130 feet); crossbedded red, brown, and greenish-grey dolomite (100 feet) at top. (Douglas, 1952)

Thickness and Distribution: Douglas reports 617 feet at Waterton on the cliffs bordering Waterton Lake. Distribution at the surface not well known but appears to be restricted to easternmost parts of Lewis thrust sheet.

Relation to Other Units: Basal contact not exposed; upper contact, with Altyn formation, conformable.

Reference:
Douglas, R.J.W. (1952), Waterton, Alberta; Geol. Surv. Canada, Paper 52-10.

Prepared by: F. G. Fox, Hudson's Bay Oil and Gas Company Limited, Calgary, August 1954.

WHITEHORSE MEMBER: Spray River formation, Triassic

Author: Warren P. S. (1945). Triassic Faunas in the Canadian Rockies, Am. Jour. Sci., Vol. 243, pp. 480-491.

Locality: On the Whitehorse River near Cadomin, Alberta.

Lithologic Characteristics: Light grey, almost white, chalky limestone, containing Middle Triassic fossils.

Thickness: The thickness of the formation ranges from 60 to 80 feet in the Brule and Entrance Map Areas and described as usually not over 300 feet at the type section.

Relation to other Units: The formation is overlain by the Fernie group and underlain by the Sulphur Mountain formation.

References:

Lang, A. H. (1947). Brule and Entrance Map Areas Alberta, Geol. Surv. Canada, Mem. 244.

McLearn, F. H. (1945). The Lower Triassic of Liard River, British Columbia, Geol. Surv. Canada, Paper 45-28.

Prepared by: V. B. Coombs, Texaco Exploration Co., Calgary, July 1954.

WILLOW CREEK FORMATION: According to fossil evidence presented by Russel (1932 b), and additional stratigraphy by Bell (1949), the Willow Creek formation is both Upper Cretaceous (Senonian) and Tertiary (Paleocene) in age.

Author: Dawson, G. M. (1883). "Report on the Region in the vicinity of the Bow and Belly Rivers, N.W.T." Geol. Surv. Canada Report of Progress (1880-81-82) p. 3B, with further definition in his reports of 1885 (p. 4) and 1884 (p. 67).

Locality: Type section not specifically designated. Formation was first studied on Willow Creek. Formation name is applicable over an area extending from the 49th parallel north-westerly in the disturbed belt to a northern limit beyond the town of Nanton where its characteristic shales fade to the north and east into the Paskapoo.

Lithologic Characteristics: Distinctive, alternating, variegated shales and sandy clays interbedded with lenticular sandstones which are essentially green-grey, fine grained, poorly sorted and loosely indurated with an argillaceous and subordinate calcareous matrix. Lithological features, which are particularly diagnostic, are the red, green and brown color and purple tinting of the shales and the soft, non-resistant character of the sandstones. "Badlands" weathering is evidenced on the rounded wash-covered outcrops.

Thickness: Formation thicknesses are influenced by the major structural feature in the area, i.e., the Alberta Syncline, and the lenticular nature of the beds: Along Waterton River over 4000' (Douglas 1951); at Castle River about 2760' (Hage 1943); on the east side of the Alberta Syncline on the Oldman River about 1200' (Russel 1932 b); and over 700' at Mokowan Butte (Williams and Dyer 1930).

Correlation: With the Frenchman and Lower Ravenscrag of the Southern Alberta Plains and Cypress Hills area, and with the Upper Edmonton and Lower Paskapoo beds of the Central Plains area. A correlation is considered tentatively with the Lance and Lower Ft. Union of Northern Montana.

Relation to other Units: The contacts with the overlying Porcupine Hills and underlying St. Marys River formations are generally accepted as transitional. The presence of an erosional disconformity on the upper contact, as reported by Douglas (1947; descriptive notes), remains probable but controversial (Bell 1949, p. 12).

Remarks: Fresh water mollusca of Paleocene age are common in scattered horizons in the Upper Willow Creek, while fossils are sparse to nil in the lower formation. A bone fragment which was described by L. S. Russel as being "definitely Dinosaur", was of paramount importance in establishing the lower formation as Cretaceous in age. A cross-bedded, conglomeratic and granitic sandstone at the upper and lower contact assists in making this division and also serves as a boundary between the Edmonton and Paskapoo formations.

References:

Williams, M. Y. and Dyer, W. S. (1930), Geology of Southern Alberta and Southern Saskatchewan, G.S.C. Memoir 163, p. 58.

Russel, L. S. and Landes, R. W. (1940), Geology of The Southern Alberta Plains. G.S.C. Memoir 221, p. 92.

Bell, W. A. (1949), Upper Cretaceous and Paleocene Floras of Western Alberta. G.S.C. Bulletin 13, p. 11.

Tozer, E. T. (1952), The St. Mary River - Willow Creek contact on Oldman River, Alberta.

Prepared by: Gordon A. Leslie, Aranada Petroleum Corp., Calgary, June 1954

WILRICH MEMBER: Spirit River Formation, Lower Cretaceous

Author: Alberta Study Group, 1952, Lower Cretaceous of the Peace River Region, Western Canada Sedimentary Basin, Amer. Assoc. Petrol. Geol., 1954, Tulsa, Okla.

Locality: Type section occurs in P.R.N.G. Wilrich #1 well in Lsd. 15, Sec. 21, Twp. 80, Rge. 13 West of the 6th Meridian. The section is present from 3180' to 3568'. This well is in Alberta close to the British Columbia boundary and about 18 miles northeast from the town of Dawson Creek.

Lithologic Characteristics: Dark grey shales with some thin interbeds of sand and silt. Fish scales and fish remains are common in the shale and glauconite occurs in the sandstones. In the eastern part of the Peace River area the upper half of the member contains a considerable amount of sandy material, whereas the lower half retains its essential character of dark grey shale.

Thickness and Distribution: The type section in P.R.N.G. Wilrich #1 well is 388' thick (3180-3568). Fairly uniform thickness eastward from the well to the vicinity of Lesser Slave Lake. Thickness increases westward from the well and is about 500' in the St. John area.

Relation to other Units: Underlain by sandstone of the Bluesky formation and overlain by sandstone of the Falher member.

Reference:

Badgley, P. C., 1952, Notes on the Subsurface Stratigraphy and Oil and Gas Geology of the Lower Cretaceous Series in Central Alberta, G.S.C. Paper 52-11.

Prepared by: C. E. Cleveland, Pacific Petroleums Limited, Calgary, July 1954.

WINTERBURN FORMATION: No group assignment at present, Upper Devonian series.

Author: Geological staff, Imperial Oil Limited, Western Division, 1950, Devonian Nomenclature in Edmonton area, Alberta, Canada, Bull. Amer. Assoc. Petrol. Geol., Vol. 34, No. 9 (September, 1950), pp. 1807-1824.

Locality: B.A. Pyrcz No. 1, Lsd. 12, Sec. 25, Twp. 50, Rge. 26 W4 M., Alberta, Canada, interval 4815'-5065'. Pyrcz No. 1 is an abandoned location on the eastern edge of the north sector of the Leduc field. Winterburn is the name of a village approximately 15 miles north of the well site.

History: Proposed to supersede the expedient usage, following the discovery of the Leduc field in February, 1947, of the inadequately defined terms Darling Silt, Red Beds and D-2.

Lithological Characteristics: White crystalline anhydrite, brown to reddish brown dolomite and green-grey dolomitic quartz silt in upper 50 feet (Graminia member). Mottled, maroon and green quartz siltstone to fine grained sandstone, in part dolomitic and argillaceous in next 40 to 45 feet (Calmar member). Thin beds of light brown crystalline, in part silty, dolomite underlain by more massive light grey crystalline reefoid dolomite with localized beds of intercrystalline and vug porosity, in part filled with secondary anhydrite, in lower 150 to 160 feet (Niaku member). West, north and east of type section the anhydrite in the upper member disappears. Roughly west of the fifth meridian the lower member grades from reefoid dolomite to argillaceous limestone and fossiliferous shale. Approximately 50 miles south and southeast of type section the upper and middle members become increasingly anhydritic and the reefoid character of the lower member becomes more localized. The characteristic quartz silt of the upper two members persists, with local variations, throughout the recognizable extent of the formation.

Distribution: When set up, the Winterburn nomenclature was restricted to a rectilineal area centred in Edmonton, of approximately 10,000 square miles. As anticipated by the Imperial Oil staff it has since been shown that the Winterburn is equivalent in age and general lithological characteristics to beds occurring throughout south central, central and northern Alberta, westward into the Rocky Mountains, eastward into Saskatchewan and the Williston Basin, northward to the Mackenzie Basin, and southward across central Montana, with the exception of areas where the beds were removed by erosion or not locally deposited (see thickness).

Present work, (Baillie, 1953) delimits the nomenclature usage to the northwest boundary of the Williston Basin by setting up a group boundary (Saskatchewan and Qu'Appelle Groups) at the top of the Niaku member equivalent. Elsewhere the areal limits of the formation remain undefined. To what extent the Winterburn boundaries prove interchangeable with and supersede that of established formations in the other regions referred to above, peripheral to the type area, remains for future work and drilling to decide.

Thickness: 0' - 500'. Type section is 250 feet. Maximum thickness of from 400 to 500 feet occurs west of the Morinville Leduc reef trend and northward into the south-east Peace River and Lesser Slave Lake areas. Minimum depositional thickness occurs over Peace River Arch where, along crest of the Arch, it is doubtful if any Winterburn equivalent beds were laid down. South and

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south-east of type section the formation thins to an average of 180 to 200 feet although locally it may not exceed 70 to 80 feet, viz: Big Valley. East and north-east the formation wedges out due to erosional truncation, the zero line extending in a north-westerly direction from a point a few miles west of the town of Wainwright in east central Alberta, and from Wainwright easterly into Saskatchewan.

Relation to other Units: Rests on Ireton shales and rarely Leduc dolomites of underlying Woodbend formation. In Grosmont area of Alberta, north of Township 67, it may rest on Hondo anhydrite of upper Woodbend. Overlain by limes and dolomites of Wabamun with exception of the southeastern sector of Alberta, where it is overlain by Wabamun anhydrite, and the truncated face of the formation in northeastern and eastern Alberta where it is unconformably overlain by Lower Cretaceous sands, shales and residuum.

Correlative with the combined Alexo and part if not all the Mt. Hawk formation, the uppermost part of the upper Fairholme, the Cheviot formation, and the Fiddle formation of Rocky Mountain; the Jefferson dolomite of the Southern Plains; the lowermost section of the Qu'Appelle group and the upper formation of the Saskatchewan group of the Williston Basin; the lower portion of the Hay River limestone of northern Alberta and possibly the lower part of the Imperial formation of Mackenzie River.

References:

Andrichuk, J. M., 1951, Regional Stratigraphic Analysis of Devonian System in Wyoming, Montana, Southern Saskatchewan and Alberta, Amer. Assoc. Petrol. Geol. Bull., Vol. 35, No. 11 (November, 1951), pp. 2368-2408.

Baillie, A. D., 1953, Devonian System of the Williston Basin Area, Mines Branch, Prov. of Man., Pub. 52-5.

Belyea, H. R., 1952, Notes on the Devonian System of the Northern Plains of Alberta, Geo. Surv., Canada, Paper 52-27.

Belyea, H. R., 1954, Cross-sections through the Devonian System of the Alberta Plains, Part 1 (Summary of), Alta. Soc. Petrol. Geol. News Bull., Vol. 2, (June) pp. 1-5.

deWit, R. & McLaren, D. V., 1950, Devonian Sections in the Rocky Mountains between Crowsnest Pass and Jasper, Alberta, Geol. Surv., Canada, Paper 50-23.

Fox, F. G., 1951, Devonian Stratigraphy of Rocky Mountains and Foothills between Crowsnest Pass and Athabaska River, Alberta, Canada, Amer. Assoc. Petrol. Geol. Bull., Vol. 35, No. 4 (April, 1951), pp. 822-843.

Layer, D. B. et al, 1949, Leduc Oil Field, Alberta, a Devonian Coral-Reef Discovery, Amer. Assoc. Petrol. Geol. Bull., Vol. 33, pp. 572-602.

Link, T. A., 1949, Leduc Oil Field, Geol. Soc. Am. Bull., Vol. 60, pp. 381-402.

Sloss, L. L. & Laird, W. M., 1947, Devonian Systems in Central and Northwestern Montana, Amer. Assoc. of Petrol. Geol. Bull., Vol. 31, pp. 1404-1430.

Wonfor, J. S. & Andrichuk, J. M., 1953, Upper Devonian in the Stettler Area, Alberta, Canada, Alta. Soc. Petrol. Geol., News Bull., Vol. 1, (September, 1953), pp. 3-6.

Prepared by: R. H. Laurence, J. C. Sproule and Associates, Calgary, July 1954.

WOODBEND FORMATION: Upper Devonian series

Author: Geological Staff, Imperial Oil Limited, Western Division, 1950, Devonian Nomenclature in Edmonton area, Alberta, Canada, Bull. Amer. Assoc. Petrol. Geol., Vol. 34, No. 9 (September, 1950), pp. 1807-1824.

Locality: B.A. Pyrcz No. 1, Lsd. 12, Sec. 25, Twp. 50, Rge. 26 W4 M., Alberta, Canada, interval 5065' - 6200'. Pyrcz No. 1 is an abandoned location on the eastern edge of the north sector of the Leduc field. Woodbend is the name of a village approximately 7 miles north of the well-site.

History: Proposed to supersede expedient usage, following the discovery of the Leduc field in February, 1947, of the poorly defined terms Green Shale, D-3, Duvernay and Fragmental limestone.

Lithological Characteristics: Upper 0 - 1600 feet comprise argillaceous to silty, dark grey to brown, thin-bedded limestones and dolomites (Upper Ireton) grading downward into green-grey calcareous, in part fossiliferous shale and mudstone, less calcareous towards base (Lower Ireton). Black to brown calcareous petroliferous and fossiliferous shale, interbedded with grey to brown, dense to granular fossiliferous limestone in next 0 - 450 feet (Duvernay). Buff to brown, fragmental to finely crystalline to dense, in part argillaceous and fossiliferous limestones, local grey crystalline reefoid dolomite lenses, thin beds of grey-green calcareous shale and black petroliferous shale partings in basal 200 - 300 feet (Cooking Lake). Reefoid phases within the Ireton interval, 0 - 1100 feet, comprise predominantly thin bedded to massive, grey, crystalline, granular to vuggy dolomite; less commonly light grey to cream, cryptocrystalline, in part vuggy and fractured limestone (Leduc). In south-eastern Alberta the Leduc equivalent contains anhydrite interbedded with dense limestones and crystalline dolomites. In north central Alberta (north of Twp. 67) another evaporitic facies occurs (Hondo anhydrite) near the top of the formation. Generally west of Fifth Meridian and in tectonically negative areas surrounding Peace River Arch calcareous shales replace the fragmental limestones of the type basal member (Cooking Lake).

Distribution: When initially set up the Woodbend nomenclature was restricted to a rectilineal area, centred in Edmonton, of approximately 10,000 square miles. As anticipated by the Imperial it has since been shown that the Woodbend formation is equivalent in age and general characteristics to beds occurring throughout south central, central and northern Alberta, westward into the Rocky Mountains; eastward into Saskatchewan and the Williston Basin, northward to the MacKenzie Basin and southward across central Montana, with the exception of the areas where the beds have been eroded or were not deposited (see Thickness).

Present work, (Baillie, 1953) delimits the Woodbend nomenclature usage to the northwest boundary of the Williston Basin by setting up the Saskatchewan Group for beds equivalent to this formation. In the extreme south where the influence of the Southern Alberta and Cambridge arch (Andrichuk, 1951) was felt the formational boundaries become obscure. To what extent the Woodbend formational boundaries will prove interchangeable with and the Woodbend nomenclature supersedes that of established formations in the other regions referred to above, peripheral to the type area, remains for future drilling and work to decide.

Thickness: 0 - 2300 feet. Type section is 1,135 feet. Maximum thickness (encountered to date) is 2,300 feet, in basinal area off north flank of Peace River Arch. Minimum depositional thickness is over Peace River Arch where beds wedge out to zero around an area of several thousand square miles. Formation thins from 900 to 1,000 feet in Stettler-Drumheller area to 600 to 700 feet in extreme southeastern Alberta. East and northeast the formation wedges out to zero due to post-Devonian erosional truncation: the zero line extending in a north-northwest direction across Alberta from a point in the vicinity of the Lea Park near the Alberta-Saskatchewan border.

Relation to other Units: Rests conformably on limy shales, argillaceous limestones and rarely partially dolomitized reefoid limestones of Beaverhill Lake formation in Alberta plains. Where fringing Peace River Arch rests unconformably on pre-Devonian quartzose and arkosic sandstones of terrestial origin or directly on weathered granite. Overlain conformably by crystalline dolomites or fossiliferous to argillaceous limestones of Winterburn except for truncated face in northeastern Alberta (see Thickness) where it is overlain unconformably by sands, shales or residuum of Lower Cretaceous.

Correlative in broad aspect with Jefferson limestone, all but uppermost section of Fairholme formation, combined Flume, Perdrix and possibly lower part of Mt. Hawk formation, lower part of Minnewanka limestones, Hay River shales, Fort Creek shales, and Saskatchewan group.

References:

Andrichuk, J. M., 1951. Regional Stratigraphic Analysis of Devonian System in Wyoming, Montana, Southern Saskatchewan and Alberta, Amer. Assoc. Petrol. Geol. Bull., Vol. 35, No. 11 (November, 1951), pp. 2368-2408.

Baillie, A. D., 1953. Devonian System of the Williston Basin Area, Mines Branch, Prov. of Man., Pub. 52-5, 1953.

Belyea, H. R., 1952. Notes on the Devonian System of the Northern Plains of Alberta, Geo. Surv., Canada, Paper 52-27 (1952).

Belyea, H. R., 1954. Cross-sections Through the Devonian System of the Alberta Plains, Part 1 (Summary of), Alta. Soc. Petrol. Geol. News Bull., Vol. 2, No. 6 (June, 1954), pp. 1-5.

Leyer, D. B. et al, 1949. Leduc Oil Field, Alberta, a Devonian Coral-Reef Discovery, Amer. Assoc. Petrol. Geol. Bull., Vol. 33, No. 4 (April, 1949), pp. 572-602.

Link, T. A., 1949. Leduc Oil Field, Geol. Soc. Am. Bull., Vol. 60, No. [illegible] (March, 1949), pp. 381-402.

Wonfor, J. S. & Andrichuk, J. M., 1953. Upper Devonian in the Stettler Area, Alberta, Canada, Alta. Soc. Petrol. Geol., News Bull., Vol. 1 No. 9 (September, 1953), pp. 3-6.

Prepared by: R. H. Laurence, J. C. Sproule and Associates, Calgary, July 1954.

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